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**MEASURING VALUE AND EFFICIENCY:
HOW TO ASSESS THE PERFORMANCE
OF THE DEFENSE ACQUISITION SYSTEM**

HEARING

BEFORE THE

PANEL ON DEFENSE ACQUISITION REFORM

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

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PANEL ON DEFENSE ACQUISITION REFORM

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**MEASURING VALUE AND EFFICIENCY: HOW TO ASSESS
THE PERFORMANCE OF THE DEFENSE ACQUISITION
SYSTEM**

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
PANEL ON DEFENSE ACQUISITION REFORM,
Washington, DC, Wednesday, April 1, 2009.

The panel met, pursuant to call, at 7:33 a.m., in room 2212, Rayburn House Office Building, Hon. Robert Andrews (chairman of the panel) presiding.

OPENING STATEMENT OF HON. ROBERT ANDREWS, A REPRESENTATIVE FROM NEW JERSEY, CHAIRMAN, PANEL ON DEFENSE ACQUISITION REFORM

Mr. ANDREWS. Ladies and gentlemen, good morning. The panel will come to order.

I am informed that we expected our ranking member, Mr. Conaway, will be present shortly. But because one of our minority colleagues is present, we are going to begin.

First of all, I appreciate the indulgence of the witnesses and my colleagues and our staff in being here at such an early hour. I hope that we did not inconvenience people terribly too much.

The reasoning behind this is that this is very substantive and important material. And we want the members to be able to have an uninterrupted block of time to really hear what the witnesses say, to engage in what I hope would be constructive dialogue with the witnesses, and not be caught up in our normal time pattern around here, which is the bell ringing to vote and conflicting with other hearings and meetings.

We really want to give our utmost and most serious attention to the material, so that is the reason for this early beginning. And I appreciate the indulgence of the members of the panel.

This morning we are setting out to try to answer the question, what is the fair measure, what is the fair way of measuring the difference between—the difference, if any—between the cost paid by the taxpayers to acquire goods and services in the Department of Defense (DOD) and the value we are receiving? Is there a difference between those two concepts? I think there is. And if there is, what is a fair way of measuring that difference?

We have two outstanding witnesses this morning who can speak with great authority to that question. One, Mr. Sullivan, in his work at the Government Accountability Office (GAO), has frankly already given us a compelling measure of the answer to that question with respect to major weapons systems. He is going to talk this morning about the most recent work the GAO has done.

And here is essentially what it says. In 2003, we had 77 major weapons systems that were subject to this kind of evaluation. We now have 96.

In 1977, the average cost differential—the increase in programs over their original base line—that is a very important concept, the original base line versus the adjusted one. But their cost increase over their original base line in 2003 was 19 percent in the aggregate. That number has gone the wrong way since 2003. It has now gone up to 25 percent in the most recent data that the GAO has presented.

What is interesting about that 25 percent, it happens to be one of the triggers in the Nunn-McCurdy legislation that was passed quite a few years ago now, it is one of the triggers that triggers a very intense level of scrutiny of a major weapons system. So it is kind of discouraging to think that, looked at in the aggregate across these 96 weapons systems, in the aggregate, they now all trigger this kind of more intense assessment.

Now, these data, as all good work does, really beg a different set of questions. Why?

And in looking at the testimony this morning, and from hearing witnesses, I am sure we are going to hear that there is a lot more to this than meets the eye.

The superficial response to this would be to say, “Well, geez. The people who are building these systems and managing them must be doing a really terrible job.” That is not necessarily so.

And I think what we are going to hear this morning is, if you go deeper into the process, you find two other questions that have to be looked at.

The first is how good or bad of a job we are doing at conceiving these systems in the first place. When there is a need identified, and there is a weapon system identified to fill that need, are we following the right process to determine what should fill the need?

What in the jargon is called an AOA, which is an independent Analysis of Alternatives, how well or poorly are we doing that? Because if we do a good job with the analysis of alternatives, we presumably go down the right path to fill the need and provide the capabilities that the service members need.

So, one of the questions I think lies below the disturbing data with which we start this morning is: How effective is that AOA system?

And then the second goes to the question of how accurate the original base line is, or how inaccurate the original base line is. It is certainly not fair to blame those who are implementing a weapons systems, if the standards against which they are being measured were unrealistic and flawed in the first place. That may or may not be the case, but it is something else, again, I think that we are going to hear about.

There is significant evidence to show that the huge adjustments from the original base line to the modified ones may not be a measure of a lack of aptitude by those implementing the systems. It may be a measurement of lack of accuracy by those establishing the original base lines.

So, the standard against which we are measured is a very important question. And frankly, it appears like we do not have the tools to answer that question particularly well.

The final point that I want to make is that we also want to go beyond this morning's discussion. This morning's discussion, by necessity, focuses on major weapons systems, major weapons acquisition.

But as we heard last week in the briefing, a significant percentage—at least half—of the procurement done under the Department of Defense is not major hardware systems, it is services. And we want to be sure that we are in a position to take a comprehensive look at those issues as they come along, as well.

I am glad that my friend and copilot has arrived. And if he has had a chance to catch his breath, I would be happy to yield to him and ask him for any introductory comments.

Good morning, Mike.

[The prepared statement of Mr. Andrews can be found in the Appendix on page 33.]

STATEMENT OF HON. K. MICHAEL CONAWAY, A REPRESENTATIVE FROM TEXAS, RANKING MEMBER, PANEL ON DEFENSE ACQUISITION REFORM

Mr. CONAWAY. All right. Thank you, sir. My apologies. The doors down in front were not open, and the police had a long rollcall as their excuse.

Mr. ANDREWS. So much for bipartisanship. Now we lock the doors on these guys. [Laughter.]

But we locked a democrat out, too? Okay. All right. [Laughter.]

Mr. CONAWAY. Yes, he went the other way.

Good morning, Mr. Chairman, ladies and gentlemen.

Mr. ANDREWS. Good morning, Mike.

Mr. CONAWAY. I think it is appropriate for the panel's first hearing that we have a senior member of the Defense Acquisition System and GAO's senior acquisition management professionals sitting side by side. It is not that often that members of this committee get a chance to talk to the Department of Defense and GAO at the same time.

Thank you, gentlemen, for making this possible and agreeing at such an early hour.

The first question this panel identified as part of the work plan was whether there is a method to reasonably measure the ability of the defense acquisition system to deliver the goods and services needed by the warfighter, and to do so in a timely fashion, and to do so at a fair price to the taxpayer.

Today's hearing will likely not answer the larger philosophical question about how one should measure value in defense acquisition, but is an important first step for us to understand how DOD and GAO currently assess performance in one segment of defense acquisition, the major weapons systems programs, that were the focus of GAO's assessment released this week.

These programs receive a great deal of scrutiny by Congress and by the media for good reason. GAO's report reveals that nearly 70 percent of DOD's 96 largest weapon programs were over budget \$296 billion, or 42 percent. This is simply unacceptable.

Everyone understands why we cannot continue to tolerate these cost increases. There is little more to be said on that subject.

But what we do not hear as much about is that the GAO had encouraging words to say about the steps the Pentagon has taken to improve acquisition outcomes, including early stage systems engineering, prototyping, measurable yearly plans, increasing accountability and minimizing requirements creep.

The report states, these changes are consistent with a knowledge-based approach to weapons development that we have recommended in our work. If implemented, these changes can help programs to reduce risk with knowledge, thereby increasing the chances of developing weapons systems within cost schedule targets, while meeting user needs.

These are encouraging signs. But to improve outcomes on the whole, DOD must ensure that these policy changes are consistently implemented and reflected in decisions on individual programs.

I hope we hear more today about these positive improvements that DOD is making and what more needs to be done. Of course, we are likely to learn that much of what DOD does to measure performance is already statutorily required.

I also hope our witnesses feel free to share their views on laws and regulations that are not assisting in their efforts to obtain the best value and capability for our warfighters. There is a balance to be struck between setting high expectations and over-regulating the system.

With that I conclude, and again thank my fellow members.

And Mr. Chairman, I look forward to the witnesses' testimony.

[The prepared statement of Mr. Conaway can be found in the Appendix on page 34.]

Mr. ANDREWS. Thank you, Michael, very much.

And just echoing my friend's opening statement, when he talks about the \$296 billion in overruns, it is interesting from Mr. Sullivan's testimony we are going to hear that the weapons systems I made reference to have a total projected cost of \$1.6 trillion. And half of that money is yet to be expended.

So, to put that in some context, if the 25 percent overrun that the GAO now reports had not been the case, the 25 percent of that \$800 billion is \$200 billion. You know, the deficit this year is about \$1.2 trillion. It is a sixth of the deficit that we are talking about, just from these systems expressed in one-year terms. So, it is a lot of money and is of great significance.

Without objection, any opening statements from other panel members will be included in the record.

I want to first go through the biographies of the witnesses.

And we are going to ask the witnesses—without objection, we have entered your written testimony into the record of the panel—to summarize your testimony in about five minutes. We are not going to rigidly adhere to that rule this morning, but we would like you to try to summarize your testimony in about five minutes, and then we will proceed to questions from the members.

David G. Ahern is the Director of Portfolio Systems Acquisition. He is responsible for providing portfolio management, technical and programmatic evaluation and functional oversight. His office sustains Department of Defense strategic and tactical programs in

support of the Under Secretary of Defense for Acquisition, Technology and Logistics, and the Deputy Under Secretary of Defense for Acquisition and Technology.

Mr. Ahern was previously professor of program management and Director of the Center for Program Management at the Defense Acquisition University (DAU) at Fort Belvoir, Virginia. While at DAU, Mr. Ahern also served as an executive course learning team mentor and instructor at the Defense System Management College, School of Program Management.

Mr. Ahern has also held business development, program management and business unit positions in the development of tactical information systems with General Dynamics Information Systems Company and the Northrop Grumman Electronic Systems sector.

A native of Connecticut—one of the Final Four participants—Mr. Ahern was a career naval officer and is a graduate of the Naval Academy in Annapolis. He is also a graduate of the Naval Postgraduate School and Defense Systems Management College. Mr. Ahern's sea duty was as a naval aviator in the RA-5C Vigilante during multiple deployments in the Pacific and Atlantic, and as an Executive and Commanding Officer of Tactical Electronic Warfare Squadron 33.

Ashore, he was head, Tactical Command and Control Branch on the staff of the Chief of Naval Operations, project officer of the Navy Space Project, Class 2 Program Manager at the Joint Tactical Information Distribution System (JTIDS) Program Office, Program Manager, Navy Tactical Data Link Systems, and Deputy of the Program Executive, Office Space, Communications and Sensors.

Mr. Ahern, thank you, and it is great to have you with us this morning.

Mike Sullivan—no stranger to this committee—serves as Director, Acquisition and Sourcing Management at the U.S. Government Accountability Office. This group has responsibility for examining the effectiveness of agency acquisition and procurement practices and meeting their mission performance objectives and requirements.

In addition to directing reviews of major weapons system acquisitions, Mr. Sullivan has developed and directs a body of work examining how the DOD can apply best commercial practices to the nation's largest and most technically advanced weapons systems.

This work has spanned a broad range of issues critical to the success in the delivery of systems, including quality assurance, transition to production, technology inclusion, requirement setting, design and manufacturing, reducing total ownership cost, software management and affordability. His team also provides the Congress with early warning on technical and management challenges facing these investments.

Mr. Sullivan has been with the GAO for 23 years. He received a bachelor's degree in political science from Indiana University and a master's degree in public administration from the School of Public and Environmental Affairs in Indiana University. Mr. Sullivan is married and has two children.

Welcome, gentlemen. We are really happy to have you with us. And Mr. Ahern, we will start with your testimony.

**STATEMENT OF DAVID G. AHERN, DIRECTOR OF PORTFOLIO
SYSTEMS ACQUISITION, OFFICE OF THE UNDER SECRETARY
OF DEFENSE FOR ACQUISITION, TECHNOLOGY AND LOGIS-
TICS**

Mr. AHERN. Thank you, and good morning, Chairman Andrews, Ranking Member Conaway, distinguished members of the panel.

Thank you for the opportunity to appear before you today to discuss how the department values the acquisition programs and assesses the effectiveness of ongoing developments in procurements. I will be brief in order to move quickly to the panel's questions.

In December of 2008, the department issued a new version of the DOD Instruction 5000.2, Operation of the Defense Acquisition System. This instruction established policies and procedures for all of the department's acquisition programs.

It provides for a structured, disciplined process and incorporates many initiatives aimed at improving not only the defense acquisition system as a whole, but also execution of individual programs. I would like to take a few minutes to highlight a few of the initiatives.

First, the department has established a mandatory—a mandatory—materiel development decision (MDD) review that represents the formal entry point into the acquisition system. Every program will go through that MDD. At the Materiel Development Decision, the preliminary concept of operations, a description of the needed capability, the operational risk and the basis for determining that a non-materiel approach will not sufficiently mitigate the capability gap are thoroughly discussed.

Also discussed is study guidance for the analysis of alternatives, which, when completed, will have examined the full spectrum of alternatives, starting with the current capability and moving to an entirely new materiel solution, with a goal of balancing capability needs with what the department can effectively acquire and afford to achieve the best value proposition for our nation.

A second major change to the DOD 5000 is a revamp technology development phase. In the technology development phase the department seeks to reduce technology risk, determine the mature technologies to be integrated into a full system and demonstrate critical technology elements on prototypes.

Competitive prototypes, whether at the system or component level, reduce technical risk, validate designs and should improve cost estimates. They will also enable the evaluation of manufacturing processes and, of course, refine requirements—again, with a goal of ensuring the acquisition enterprise pursues the best value solution to meet warfighter needs.

Taken together, the Materiel Development Decision, a materiel solution analysis and a technology development phase with competitive prototyping help to define the best value acquisition program to meet the warfighter needs.

We then execute the selected alternative in the Engineering and Manufacturing Development (EMD) phase, using additional tools to keep the program on track.

The Acquisition Program Baseline is the key document for program management. It reflects the approved program being exe-

cuted. It describes the cost estimate, the schedule, performance, supportability and other relevant factors for the program.

That Acquisition Program Baseline is the way that we track the progress of the program through the development in EMD and on into procurement. An acquisition strategy describes how the program manager plans to employ contract incentives to achieve required cost, schedule and performance outcomes.

Technical reviews are another tool the department uses to assess program status and for decision-making purposes. There are Defense Acquisition Board reviews where the members advise the Under Secretary of Defense on critical acquisition decisions.

Further, there are configuration steering boards held by the service acquisition executives that meet at least annually to review all requirements, changes and any significant technical and configuration changes in their programs that have the potential to result in cost and schedule impacts. Such changes will generally be rejected, deferring them to future blocks or increments.

Program support reviews are means to inform the Milestone Decision Authority and program office of the status of technical planning and management processes by identifying cost, schedule and performance risk and recommendations to mitigate those risks.

Defense acquisition executive summaries review programs monthly and provide an early warning report describing the actual program problems, warnings of potential problems and mitigation actions.

In addition to the program level tools described above, the department also employs mechanisms to monitor contract-specific performance. Earned value management is mandatory on cost and fixed-price incentive contracts above a certain low threshold value. It is a well-known tool used by both government and industry program managers to measure contract performance against a contract baseline, and it provides an early warning for baseline deviations and a means to forecast final cost and schedule on that contract.

I have only touched on a few elements in the new DOD 5000, aimed at ensuring programs are started with a solid foundation, are focused on disciplined execution and deliver capability to the warfighter within cost and schedule parameters.

It will take time for us to fully realize the benefit of these policy initiatives, and we will continue to look for opportunities to further improve the defense acquisition system.

I look forward to the opportunity to work with the members of this panel on this critical task, and I am grateful to the members of this committee for your support for the Defense Department. Thank you.

[The prepared statement of Mr. Ahern can be found in the Appendix on page 38.]

Mr. ANDREWS. Mr. Ahern, thank you for your service and your excellent work throughout your career and your contribution this morning. Thank you very much.

Mr. Sullivan, welcome. Welcome back.

STATEMENT OF MICHAEL J. SULLIVAN, DIRECTOR FOR ACQUISITION AND SOURCING MANAGEMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. SULLIVAN. Thank you, Mr. Chairman, Ranking Member Conaway, other members of the committee. I am pleased to be here this morning to discuss how best to measure the value DOD is providing to the warfighter.

Earlier this week, we reported that a cumulative cost growth in DOD's portfolio of 96 major defense acquisition programs was \$296 billion, and the average delay in delivering promised capabilities to the warfighter was 22 months.

These outcomes mean that other critical national priorities go unfunded, and warfighters go without the equipment they need to counter ever-changing threats. This should be unacceptable.

A single metric or set of metrics is not enough to monitor acquisitions and gain efficiencies. However, a cross-cutting set of metrics that can measure knowledge, processes and outcomes can be employed to improve acquisition outcomes.

We think about metrics and their value in the following context.

First, we use knowledge metrics to determine how well acquisition programs are managing and retiring predictable technology, design and manufacturing risks by gaining knowledge and retiring risk. These metrics are valuable, because they can predict problems, and they can identify the causes of those problems, so you can attack those causes.

Second, we use cost, schedule and capability metrics that measure a program's health. These metrics have intrinsic value as simple measurements, but they do little in the way of diagnosing cause and effect. This is a way for managers and decision-makers to keep an eye on the program.

Third, there are certain indicators that we look for that are perhaps more important than the metrics, because they determine the realism of the acquisition plans from the outset, as the chairman was referring to in his opening statement.

These are a set of prerequisites for any program. And without them, we question the value of any metric as you move forward.

We know that the knowledge and program health metrics we use to measure a program's progress and outcomes are valuable when used in realistic, schedule-driven product development environments. They are important indicators to decision-makers. They work when they are measuring realistic plans and goals that are supported by doable requirements, appropriate cost and schedule estimates, and stable funding.

Our knowledge metrics identify potential problems that could lead to cost and schedule shortfalls, and their likely causes. They identify technology readiness levels very early, measure design stability by about midway through a development program and track whether critical manufacturing processes are in control at the start of production.

They have predictive value. Generally, programs that do not measure these risks at the right junctures will encounter a cascade of problems beginning with design changes and continuing with parts shortages, changes to the manufacturing processes, labor inefficiencies on the manufacturing floor and quality problems that

will cost money. All of these things delay programs and add to their costs.

Outcome metrics provide useful indicators about the health of acquisition programs, and are valuable tools to improve oversight. Last year, the Office of Management and Budget (OMB) tasked DOD to work with us to develop a comprehensive set of outcome metrics, to track program costs and schedule performance and trends. We agreed to track trends and changes across eight different cost and schedule data points, which are in my written statement—I will not go through them here—from each of the program's, from their original baseline, from a five-year-out period and from a year ago. We do that on every program.

These metrics give decision-makers, such as you, some visibility into the direction an acquisition may be heading in terms of cost and schedule.

We scale these outcome metrics up from the individual programs to a portfolio level, to provide senior department leaders and the Congress with a snapshot of the cumulative impact of poor program performance on the relative health of the overall portfolio and which way it trends.

For example, we know that the cost of the portfolio has doubled since 2000. There are 19 more major acquisitions in the portfolio.

Development cost, as the chairman referred to, has grown by 42 percent. And cost growth has forced the department to reduce quantities on many programs. Programs are getting less for their money, DOD's overall buying power is reduced and less funding is available for other priorities.

Metrics by themselves cannot be valuable unless the department does a better job ensuring that acquisitions start with realistic baseline estimates for cost and schedule. I think Mr. Ahern went through a lot of the initiatives in the new policies that we think are encouraging in this regard.

We believe there is a set of prerequisites that must be a part of any acquisition strategy before any measurement of an acquisition's health can be valuable. Otherwise, metrics measured unrealistic estimates will do no good.

Quickly, these prerequisites include: number one, setting priorities by ensuring joint acquisitions more often and validating only candidates that are truly needed and feasible; number two, making a knowledge-based, evolutionary business case for the product; number three, separating technology development activities from product development activities, which we think is really key, because if you get immature technologies onto these product development programs, they cause a lot of problems; number four, limiting the time and the requirements for product development to a manageable level; number five, employing systems engineering discipline early to develop realistic cost and schedule estimates before product development starts; and committing to fully funding development programs once they are approved.

Mr. Chairman, I will stop there and conclude my statement. I will be happy to answer any questions the committee may have.

[The prepared statement of Mr. Sullivan can be found in the Appendix on page 51.]

Mr. ANDREWS. Well, thank you, gentlemen, both, for very edifying and useful testimony. We appreciate the effort. And as I say, your full statements have been entered into the record.

Mr. Sullivan, the title of your testimony is "Measuring the Value of DOD's Weapon Programs Requires Starting with Realistic Baselines." And I think that that is a point that is made very forcefully in your testimony this morning and beyond that. And you highlight the importance of the realism of acquisition plans.

I think it is important to note that, not only is that an important measurement tool, but it has everything to do with whether the Congress can make decisions based upon realistic assumptions. You know, if a system is sold to us on the basis that it is going to cost \$1, and a realistic projection would be it is going to cost \$1.25 or \$1.40, it has a very different set of dynamics that would then take place in our decision-making.

So, this is really a separation of powers issue, in a sense, that for us to make an intelligent, clear-eyed decision about what to do, we need better data on which to make that decision.

What recommendations would you make? And I know you do this in your written testimony, but I would like you to elaborate. What recommendations would you make to improve the accuracy and transparency of the planning process, the standard-setting process that goes into these decisions?

And secondly, to what extent do you think the new 5000.2 guidance moves us in that direction?

Mr. SULLIVAN. Okay. First of all, I think the 5000—the new 5000 guidance—does a lot, I think, to move us in that direction.

Where we would, as auditors, where we would—and people that are interested in oversight—we have problems with what is required and what is suggested. And, you know, often times in those policies, there is a lot of wiggle room and a lot of encouragement to do things, but not a lot of requirements to do things, so we always take issue with that.

Having said that, the principles in that new policy—and Mr. Ahern went through some of that—

Mr. ANDREWS. Right.

Mr. SULLIVAN [continuing]. Address a lot of the things that we think have to be in place to improve these weapon system—

Mr. ANDREWS. Tell us what some of them are.

Mr. SULLIVAN. For example, at the beginning, the initial decision—it escapes me for the moment—

Mr. AHERN. MDD.

Mr. SULLIVAN [continuing]. The MDD decision is much more of a joint decision today. I think they have tried to bring in—you know, there are three big processes. There is a requirement-setting process, the funding process and then the acquisition execution process. And they have trouble speaking to each other a lot of times.

I think there has been a real push to try to get them together, so that there is agreement, a joint agreement on how to move forward with a program. That is one way.

The Analysis of Alternatives that you spoke of, I think the policy is trying to tweak the way that they analyze alternatives and try to—and is trying to bring a little more jointness into that, for ex-

ample, so that you do not have—in the past, an Analysis of Alternatives was done by perhaps one of the services.

And if it was the Army, they were looking at something that had wheels. And if it was the Navy, it was something that floated. And if it was the Air Force, it flew. And so, there were probably a lot of options that did not get full consideration in that.

As you move to more jointness, I think you get a better idea—

Mr. ANDREWS. Do you think it is also characteristic in that AOA that there was not adequate consideration, simply revamping an existing system as opposed to starting all over again?

Mr. SULLIVAN. Probably that was the case. And so now, the guidance does state that the number for—you know, when you have a new threat or something that you have to counter, the first thing you do is look at doctrine. You look at training, you look at a different way, or modifying existing systems.

You know, that is a tough one to answer. But I think a lot of programs do get started that probably should not. You know, they probably could have found an alternative way to do things.

Mr. ANDREWS. Are you satisfied that there is enough guidance on looking to the commercial world as a place to look for solutions to these needs that are identified, in the AOA process?

Mr. SULLIVAN. I am not satisfied that they do enough of that.

You know, usually when there is a—when they are thinking—well, I will give you an example of kind of commercial, off-the-shelf programs that the department has tried to start in the past. I think it is fair to say that programs like Warfighter Information Network–Tactical (WIN–T), which is a communications program, was designed to kind of take commercial, off-the-shelf items and modify them a bit, and make them available to the warfighter. And that did not work very well.

There has been a lot of talk about the Presidential Helicopter and how that has gotten way out of control, because they were thinking that would be a commercial, off-the-shelf item. And it came in, often times—

Mr. ANDREWS. Who has been talking about that? I do not know.

Mr. CONAWAY. First I have heard of it.

Mr. SULLIVAN. The requirement-setting process has an impact on all that stuff.

Mr. ANDREWS. Right.

Mr. SULLIVAN. Once you have a feasible idea to do something commercially, and the users kind of start looking at it, all of a sudden requirements start getting piled on that, and it becomes something much different.

Mr. ANDREWS. Well, thank you, gentlemen.

I am going to turn to Mr. Conaway for his questions.

Mr. CONAWAY. Well, thanks, gentlemen. I appreciate you both being here.

You know, it is pretty presumptuous of us to think that we are going to ever know as much about acquisitions as the panel, or probably a bunch of you all sitting in the room.

I guess our role, though, is to try to elicit from you the solutions, because I have got to believe that with the vast background that both of you have, and everybody else across the system has, nobody wants us in the position that we are in today. And so, having us

ask the right questions, I think is the best job that we can do in this circumstance.

On the mandatory development decision, I guess, MDD, is there enough rigor there to make sure that the folks making the estimates are not simply—and this is a bit crass—but simply low-balling the estimates in order to get the program started? Because once something is started and the initial inertia is overcome, it moves, whatever happens.

And so, is there enough, you know, auditing or somebody checking the guys doing these assessments in that initial phase to say, you know, these estimates are not realistic?

Mr. AHERN. I think you are talking to me, sir, congressman.

The MDD process, we really do not get too hard into money. But as was described in my—into the funding that is going to be required—that really is a transition period between the Joint Capabilities Integration and Development System (JCIDS) process, as Mr. Sullivan mentioned, and “little a.”

Let me elaborate for a minute what I expect in the MDD. And I am absolutely a proponent of it. I think it is really critical.

As Mr. Sullivan said, it is the place where we get both the resource sponsors, the senior people from the Joint Chief of Staff (JCS), as well as ourselves, in a room and talk through what it is we are trying to do. And that is predicated on a good job over in the JCS arena of going through the Concept of Operations (CONOPS) for the system, whatever they are talking about, going through an Analysis of Alternatives themselves, a smaller Analysis of Alternatives.

Is a materiel solution needed, or can we change training and doctrine and get the job done, and that capability gap in that way?

If a materiel solution is needed, then they neck it down. And they have an Initial Capability Document (ICD) that is actually approved by the Joint Requirements Oversight Council (JROC), of the very senior group in the Joint Chiefs of Staff (JCS).

So, coming into the MDD, the JCS has said, this is a capability gap that we need to fill, and it needs a materiel solution.

In the MDD itself, with that as a starting point, and the JCS briefs that ICD what it is they want from a materiel solution, then we talk through what the Analysis of Alternatives needs to be. And that is where we kick off and start the Analysis of Alternatives.

We have all had an opportunity to look at the guidance for the Analysis of Alternatives. And it is going to start, Chairman Andrews, with, can we modify the current system? That is absolutely already there.

And then it will gradually go up in a ladder step, if you will, all the way to pressing technology to a really—got to choose my words carefully here, gentlemen—but you can have a number of alternatives, one of which, the last of them could be we have got to push technology to get what it is.

But then, in that Analysis of Alternatives, you have got to look at measures of effectiveness. How is it supposed to perform? What reliability are you expecting of it? What suitability are you expecting of it? What survivability are you expecting of it?

And then you need to look at the costs. And so, what we will do in the MDD is, we will talk through that acquisition, the Analysis

of Alternatives plan. Is it rich enough? Is it robust enough? Is it considering the alternatives that you are talking about?

And I have done one of these. I am not just making this up as I go along. We have been through one.

I structured very carefully to be sure that we had that dialogue, because we have the senior stakeholders in the room, and we want to get the benefit of their advice and counsel as we are going forward. And then we will talk through it.

Of course, a very significant part of the Analysis of Alternatives is, in fact, the cost analysis versus the various alternatives that we are talking about. If you are going to modify a system, it should be less expensive than pushing technology. And that needs to be compared.

What are you going to get in terms of suitability and effectiveness versus cost? That is part of the outcome. And do you understand the environment that it is going to be operated in? So, we talk through the Analysis of Alternatives plan.

And finally in that MDD, we give the program manager—and there is a designated program manager for all of them—an opportunity to tell us what he thinks the whole program will look like. Now, that is early to need.

But there will be funding associated, because, as you all know, we do a Program Objective Memorandum (POM) over a number of years. And there will be a rudimentary schedule—not prejudicing the AOA, because remember, the program has not started yet at the MDD.

Following the MDD, we go to a milestone A, which is, as Mr. Sullivan recognized, the beginning of the technology development phase. And following that technology development phase, then we will get into the product development phase. That is where we snap the chalk line and put down the basis of the program, of the cost estimate.

But we do want to have the program manager talk to us in general terms about how they are looking at this program, how long it is going to take to get that capability to the warfighter.

So, I hope that in a brief—

Mr. CONAWAY. Well, I would be—

Mr. AHERN [continuing]. Brief, why it is the MDD is important to us, and what we do in that MDD and how we go forward with it.

Mr. CONAWAY. A classic example of not answering my question.

I was more focused on the cost estimate and a rigorous review of that, wherever it fell in the system.

Mr. AHERN. Okay.

Mr. CONAWAY. I am not sure it was before we decided to go forward we decide how much it is going to cost, or after we are into it and we decide it is going to cost.

Mr. AHERN. Can I answer that?

Mr. CONAWAY. But—

Mr. AHERN. I am sorry.

Mr. CONAWAY. Yes, but I want to make sure that whoever is responsible for doing the cost estimate—I come from an oil and gas background. And when you get a geologist who has put together a new prospect, they get in love with it. And they want it sold, they

want it done. The problem is, they have got to go sell it to a third party, who takes a different look at it than the guy putting it together.

So, I do not want our folks so in love with their prospect—and in this sense, it was an acquisition system—that they lose sight of—lose objectivity.

Is there in that, somewhere we snap the chalk line, an independent—not necessarily the GAO—but an independent review of this whole system to that point, so we make sure we do not have folks who have fallen in love with a system and are no longer objective on the costs and all these other things you mentioned?

Mr. AHERN. Yes, sir, there is, absolutely. There is an independent cost analysis done on all the major systems by the CAIG, the Cost Analysis Improvement Group, on every system.

So, when we come to snapping the chalk line at what we call milestone B, the beginning of EMD, we will have two separate estimates to look at, one from the service and one an independent cost estimate—

Mr. CONAWAY. Okay. One quick follow up.

Mr. AHERN [continuing]. Done totally differently.

Mr. CONAWAY. The 5000.2 regulation from last August, are you going back and applying those to all existing systems? Or is that just for new systems going forward?

Mr. AHERN. It will apply to existing systems, depending upon where they are, sir.

One of the programs that is already in production, it probably will not see too many changes, based on the new 5000.2.

Mr. CONAWAY. Even if—

Mr. AHERN. But if a program has just started, we will absolutely start it in the last six months or so.

Mr. CONAWAY. But if changes could rein in some cost overruns, though, you would do that, wouldn't you?

Mr. AHERN. No, sir. We would not force anything in. We have not fundamentally changed the sequence of events that a program goes through. What we have tried to do is increase the discipline in following that sequence of events.

As Mr. Sullivan remarked, there is room to tailor—or as he said, “wiggle”—inside the 5000.2. What we are trying to do is reduce the wiggle and ensure that we have a disciplined process that we follow for each and every of the acquisitions.

So, I do not think we would—we are conscious of what you are saying, sir, and we would not drive cost into a program to adhere to the 5000.

Mr. CONAWAY. You would drop cost out of it, though?

Mr. AHERN. I think we will. I am really keen on the idea of doing that technology development phase after we do the Analysis of Alternatives, to go to that phase where we will look at competitive prototyping—and we have already done a couple of programs along those lines—where we have two or three competitors putting together either an entire prototype or key elements of the system, and demonstrating it.

And that, as I said in my remarks this morning, that helps us to understand, is the technology available. And frankly, in putting together a prototype, it can give us a real leg up on cost estimating.

So, I think that this new 5000.2, with its emphasis on that phase, should, in fact, help us to drive costs out of programs. It will tell us about technology maturity, and it will tell us what is doable within a period of time.

Mr. CONAWAY. Thank you, Mr. Chairman.

Mr. ANDREWS. Thank you, Mr. Conaway.

Mr. Cooper.

Mr. COOPER. Thank you, Mr. Chairman.

Thanks to the witnesses.

It seems to me that, if there has ever been an alphabet soup of bureaucratic quagmire, this is it, with 130-some attempts to reform the system since World War II. And I am not sure that anyone can even understand whether any of these attempts or reforms worked or not. So, I guess our first job is to not make the problem worse.

When the Secretary of Defense told us at breakfast last week that there was something like 50,000 private sector contractors whose only job is to oversee other private sector contractors on things like contract performance and things like that, I think it gives us and the public an idea of how monstrously complex this whole process has become.

It seems to me that—and forgive me, because you gentlemen have spent decades studying this, and we are largely new to the complexities of this topic—that some of these problems are self-inflicted wounds.

Mr. Assad talked to us recently and said basically that it is the CAIG that comes up with much more realistic cost estimates. But sometimes politicians and contractors refuse to listen to those, and we prefer the lower numbers, however unrealistic they are.

So, when it comes to setting and enforcing baselines, well, we sometimes enjoy self-delusion, because, guess what, the numbers usually, almost always turn out to be higher.

I wonder about things like the rapid acquisition process, if it is essential. And maybe this is just for smaller systems. But if we can somehow bypass our own bureaucracy when we need to, why don't we do it more often?

I also wonder about if there is any good news in here? Is there a pony here somewhere? Are there certain systems that are so astonishingly reliable or productive or necessary for the warfighter? You know, have any contractors ever been rewarded for those?

In my area, we fly still a lot of C-130s, most of which were built before I was born. And they are still going, and they are still the warhorse. They are still reliable.

So, I would like to leaven the bad news with the good, if there is any good news. And I still want to be reminded that we spend more on our defense than almost every other nation on Earth combined.

So, we are the policemen of the world. We are the warfighters of the world. You know, the value for the taxpayer is increasingly essential as our taxpayers are losing patience with lots of different things that we are undertaking.

So, forgive me for the general sort of take on this. But when gentlemen like you come to us and say there are strategic and tactical failures in the procurement of our essential weapons systems, that

is from top to bottom. That is the military. That is the Secretary of Defense (SECDEF). That is us, the White House.

So, this may be a task far larger than a simple panel can undertake, but we appreciate your guidance. And if, in the time remaining, if either of you would care to reflect, I would appreciate it.

Mr. SULLIVAN. Well, you know, I would like to go back to, after hearing you speak there, the chairman asked the question to me, what are the things that should change. And I do not know that I answered it real well.

It is those prerequisites, though, that I talked about earlier. And when you look at what you just described, we kind of describe that as—I do not want to use the word “failures”—but a lack of success, if you will, at a strategic level, and then down into the execution phases.

And at a strategic level, if you want something good to happen, probably the first thing, the first prerequisite is to have less programs vying for this money that is available. When you have the number of systems—and one of the reasons there are 96 systems that are in the portfolio now, is because it is a relatively service-centric kind of a system, so you have a lot of parochialism.

And I think sometimes where you could have a joint solution, or you could have a solution that does not have to become an acquisition program, the services kind of compete with each other to get programs started.

So, at a top level, Office of the Secretary of Defense (OSD), the Secretary of Defense can do a better job of getting a handle on that, trying to control the service-centric aspects of this and try to reduce the number of programs that are really competing in unhealthy ways for that limited dollar that is out there.

Mr. COOPER. The average tenure of a SECDEF has been 16 months over the last 40 years.

Mr. SULLIVAN. And in fact, the average tenure—we looked it up—of the Under Secretary of defense for acquisitions is around 16 to 18 months. So, there is no real good continuity. That is an excellent point.

I do not know what the answer to that is, unless there is an undersecretary position that can somehow have a time term, or something like that, that would be able to stay in place longer.

But the turnover really affects a lot of this. You cannot prioritize properly.

Once you cannot kind of keep control of the number of programs that are beginning, when you get too many programs into this portfolio, you get unrealistic baselines as a result. And I would say, you know, that is the other thing, that you need to have requirements that are analyzed a lot more.

I think the key thing that the new 5000 policy does is the preliminary design review that they are calling for now. They want to do that right around the milestone B, which is where they snap the chalk line, as Mr. Ahern—that is when they start spending the big money. The earlier they do that, the more realistic estimates they will get, if they are doing that properly. It is a lot of systems engineering that has to be done early.

And that kind of sorts out, you know, risky technologies. And unrealistic requirements are going to drive unrealistic cost and schedule estimates.

If you do not understand the requirements that the user is coming up with, and you do not have discipline there to say we cannot do all that right now—you know, there are technologies that you have to develop; we can get that in the next generation, but not now—these programs will be hard to control.

Mr. COOPER. Thank you, Mr. Chairman.

Mr. ANDREWS. Thank the gentleman from Tennessee.

The gentleman from Colorado, Mr. Coffman, is recognized for 5 minutes.

Mr. COFFMAN. Thank you, Mr. Chairman.

Mr. Sullivan, can you give me an example—I think you mentioned immature technologies—can you give me an example of that?

Mr. SULLIVAN. Well, for example, programs. You know, I hate to single out programs, but I will take one that is almost done, I guess. The F-22, for example, had technologies that were part of the key performance parameters of the aircraft that were very immature when they started milestone B and started spending the big acquisition dollars.

And they fused avionics on that aircraft. They did not understand those technologies well at all. In fact, some people would say they were not invented when they opened up the factories to build that, some of the propulsion technologies. Some of the stealth technologies they were not real sure about on that one.

I do not want to single out the F-22. You can pick almost any major—even the C-17, which was a relative—you know, it was a big cargo aircraft with relatively mundane requirements, not for a cargo aircraft, but in general. And they had some technology issues on that with some of the material technology they were using that caused them a lot of problems. Very immature technologies on that.

You can name almost any really made—the Future Combat Systems, as, you know, we have looked at that and found that—I do not know the exact numbers, but it is maybe 50 or 60 different key technologies that are supposed to drive that system. Probably the majority of those are too immature to be in product development.

And the way we look at that, that we have something called technology readiness levels that, actually, we recommended that the department begin using years ago. And the department has started using those.

And, in fact, Director of Defense Research & Engineering (DDR&E) does these technology readiness assessments that Mr. Ahern referred to, so now they are doing that on every major weapon system acquisition before it begins. They go in and look at those and assign technology readiness levels to those programs.

Some are still beginning with technologies that are too immature. But I would say they are getting better at that.

Mr. COFFMAN. And you said words to the effect that there are some programs that are not good candidates, that the system does not necessarily ferret out programs that are the best candidates.

Mr. SULLIVAN. You would like examples of those?

Mr. COFFMAN. Could you give one example of that?

Mr. SULLIVAN. Well, that was a kind of a general—more of a general statement.

I think that it would be—if you want to consider a good candidate to start product development, what we think the best practice for that would be is a candidate where you understand the requirements, you have looked at the requirements and determined that there are things you can do and things you cannot do, and you have gotten ridden of some of the requirements that are not doable.

You have looked at your funding, and this program fits into a funding profile that the department can count on, and you have looked at technologies and things like that. And all of these things fit.

I would say that hardly any of the major weapon system acquisitions are good candidates, according to that criteria. Lately there have been a couple, I think, that we are looking at now that we think the department is doing good with.

I do not know. Small diameter bomb is an example of that, where they have really looked at those requirements.

Mr. COFFMAN. Okay. Let me ask a question of both of you.

In 1992, I was with the Marine Corps, and came up here on Capitol Hill and had a meeting with the officer in charge of the Marine Corps liaison program. He was a brigadier general whose name escapes me right now, but he said something that I have never forgotten. And I would like if you would both respond to this.

He said that, kind of almost—I will paraphrase it. We get weapons systems that we neither want nor need, but are based on a congressional—but are manufactured in a congressional district whose congressman sees it as a jobs program for their district.

Can you respond to that?

And that was his statement in 1992. First of all, did you think that that statement was reflective of the environment in 1992? And is reflective of the environment today?

Mr. AHERN. No, sir.

Mr. COFFMAN. Okay.

Mr. AHERN. I mean, let me say—I mean, as you read my biography, I was program manager and Program Executive Office (PEO) at that period of time. Obviously, I am aware that there are—congressmen have industry in their district.

But I have never felt—never, ever felt—that we were pressured, encouraged or in any way directed to do anything that entered into that. I honestly think that we made mistakes, that each time we started down the road toward a product development, we have done it as well as we can.

We appreciate your interest and support, but I have never felt that we have been pressured into doing something for that kind of a reason.

Mr. COFFMAN. Okay.

Mr. ANDREWS. If the gentleman would yield just a moment, I would like to piggyback on this question.

Mr. Ahern, could you say the same thing about a situation where there has been a cost overrun in an existing program and there has been an effort to limit it or eliminate it, there has not been congressional pressure to resist that elimination or cutback?

Mr. AHERN. Well, as you know from my portfolio, I have been through a number of cost growths, because it is a difficult job. And again, I can say, yes, sir, never has happened. Never has happened to me personally, and I have had some fairly senior jobs in the Pentagon and in the Navy and in the Air Force.

No, sir. It has absolutely never happened to me. And to my knowledge, the work that we have done in the Pentagon, the reviews, the Nunn-McCurdy reviews, I have not heard that at all, sir. No, sir.

Mr. ANDREWS. Mr. Coffman, thank you. Mr. Ahern, thank you.

Mr. COFFMAN. Mr. Chairman, I am wondering if Mr. Sullivan might be able to respond.

Mr. SULLIVAN. Yes, I think the first part of your question I can deal with, and that is a warfighter saying that they did not get what they need. The reasons are many-fold.

But the one that I look at most is, a lot of times a warfighter does not get their urgent needs, because we are busy working on very highly complex, single-step-to-big-bang capability systems that are draining a lot of funds and time and energy, like the F-22 or the Joint Strike Fighter or the Future Combat System.

Or you can go across the board. A lot of these big, you know, kind of unachievable requirements programs take so much time and so much money, that I think a lot of times the warfighters—there are bill-payers out there for these, right? We all understand that.

So, there are smaller programs that have to pay the price when an F-22 program begins with an unrealistic cost and schedule estimate and every year needs to be plused up in order to get the development through. And so, people pay for that.

And I think that is something that needs to be looked at, as I think the warfighter suffers that way, because these big programs are taking the dollars.

The other thing I would say is, if you look at the Mine Resistant Ambush Protected (MRAP) vehicle acquisition, the MRAP acquisition actually was pretty good, you know. Once they focused on the fact that they needed to counter this threat, and it was an urgent threat, they moved very quickly to get MRAPs to the field.

Before that, I think that this acquisition process hindered the ability to do that, because there were other acquisition programs—you know, the Army, for example, had other programs that it needed to fund, and things like that. I think it took a long time for people to accept the fact that the MRAP had—we had to put money into this, we had to go with requirements that were doable right now, and we had to meet an urgent need.

Once those decisions were made, that went pretty well.

Mr. ANDREWS. If I may, just also, I think one of the reasons it received such a high level of congressional scrutiny on an almost daily basis, Chairman Hunter at the time, Mr. Skelton watched the process like a hawk, as did several other members. And I think there is some subjective value—some suggestive value in that.

Mr. ELLSWORTH is recognized.

Mr. ELLSWORTH. Thank you, Mr. Chairman. And I think my comments to be more general.

First, in fairness, I want to say that we brought up U. Conn.'s basketball program. I thought I had better bring up Mr. Sullivan's alma mater——

Mr. SULLIVAN. Maybe not right now. [Laughter.]

Mr. ELLSWORTH. They have been known to throw a few balls through the hoop over the years, so hopefully they will get back to that.

Mr. SULLIVAN. Thank you, sir.

Mr. ELLSWORTH. When I first got put on this panel and you distributed some paperwork, one of the charts that jumped off the screen was the actual chart that showed the acquisition process. It reminded me of a Dr. Seuss configuration. And that was funny in the Dr. Seuss books, but in military acquisitions, I did not find much humor in that, and thought, you know, how in the world can anybody navigate their way?

And as I still try to learn that system, there are just things that jump off the page. You would almost have to think it was planned confusion. And I hope that is not the case.

But it would seem to breed the shirking of responsibility, how we go through, and how many points we could push off the responsibility on these decisions.

And another thing comes to mind, and I think that Mr. Coffman said it well. And I heard the president—I think Mr. Cooper and I were at a meeting at the White House a few weeks ago where the president said, "I have to make decisions on national defense really based on national defense, not on a congressman's district and what they make there." And so, that gives me great hope that those decisions will be made on that.

One of the things we also have to be—and maybe you could talk to this—is fairness to the contractor. You know, when we are building the hull of a ship and signing that contract, and then it is designed as we go, as we build up from the basic platform up, not unlike the Congressional Visitors Center, where it started off at \$300 million and kept changing and changing and changing, and then went to \$600 million. I think it is the same with the helicopter, if we keep adding things as we go.

We have also got to be able to give these—nobody is going to go out and just build a ship and hope that the United States government buys that ship, or get ready and build a factory that is ready to go, whether it is two submarines a year, one submarine a year and say, hey, I hope they up that someday.

We have to give the contractor some kind of vision of what we are looking at. I know that is tough in two-year cycles and six-year cycles and every four years. But I think we have to give them something to look at when they are putting employees together and buying equipment, and how we address that along with rapid acquisition.

Where is the middle ground there between the normal acquisition process and rapid? Is there something in between there that works better, simplifying it, making the steps down?

So I guess, if I had direct questions, it would be, you know, maybe we can look at the percentage of programs pulled just because of cost. The warfighter needed it, but it was just too expensive.

Or the percent pulled because we thought we needed it. It sounded good. It would be nice to have. But then we realize halfway in, maybe we do not. It was a great wish, but we did not really want it.

And I am just talking in general. I know that this is our first meeting, Mr. Chairman, and I appreciate it, as we try to get our arms around it. But maybe you could address the fairness to the contractor and how we look to improve that system also.

Mr. SULLIVAN. The way I look at that is—that is a really good question, because obviously, we are in a—the defense industry is an industry that does not necessarily build things in volume, because—you were kind of iterating to that.

There are not real commercial markets for these things. These are going to be—you know, you build a couple of submarines and you are done. You build a number of fighter aircraft, and there is no more market for that. There is no re-sale. There is nothing like that.

So, you are starting out with an industry that—this is very capital-intensive, very labor-intensive and low volume. And in addition to that, it is cutting edge.

And I do not think any of us will ever get to a time where it is not risky to build defense acquisitions, these big weapon systems, because we want them. We want the best in the world. The risk could be a lot less than that.

So, what the department usually does with these big contractors, the way they deal with that, I think, is with these cost-plus contracts that are a necessary part of doing business, because of what you referred to.

No company is going to, on their own nickel, begin to invest in the facility and the tooling that they need to take care of the government, because that is the only game in town. So, if they do not get it, they have wasted their money.

So, the government pays for all of that. So, that is kind of the fairness to the contractor, I guess, is we kind of take on their risk.

On the other hand, we look at the funding on an annual basis, and never really give contractors on some programs the stability that they need, the security they need in receiving those funds on a year-to-year basis to be able to do their job better.

And when you combine that with the requirements that we have already discussed, when you have a contractor working on a weapon system that has capabilities that they really are not able to build right away, and they have this cost-plus contract, and they have the President and the Congress every year looking at their budget, it does create a really unstable environment for them to operate. So, those are some things.

Requirements are unachievable. Cost-plus contracting comes up a lot. I think a lot of people talk about getting rid of it. I do not think necessarily reasonable people think that is a good idea. But if you can get to a position where you build—where you have requirements to build things that are doable, the cost-plus contracts make a lot more sense.

Mr. ELLSWORTH. Thank you both very much.

Thank you, Mr. Chairman.

Mr. ANDREWS. Thank you, Mr. Ellsworth.

Mr. Hunter is recognized for 5 minutes.

Mr. HUNTER. Thank you, Mr. Chairman.

And in the interest of time here, we will start off with my first question. In 2003 to 2008, we have had kind of a permissive environment. I think you would agree to that.

Who was responsible, if you had to lay it out in terms of who was most responsible to least responsible for the permissive environment, that maybe the services and Congress and contractors took advantage of and are now getting reined in? Who is responsible? When it comes to DOD, Congress, contractors, who would you lay the blame on the most from 2003 to now?

Mr. AHERN. I started here in 2006. And, of course, I was an instructor before that.

I would not go to blame. I would say that the discipline in looking at the system, at the elements of a development going forward, were not as rigorous then as they are now. But I am not sure that I could say that the blame is there. The system was always there. The system has always been there.

And there have been some good programs started, and they are continuing to execute through that period of time. I think of the P-8, the Navy's replacement for the P-3, which I think was started in that period of time.

So, I am unable to ascribe blame. I think a number of the programs that are in the portfolio Mr. Sullivan mentions are, in fact, executing over the last 5 years quite well. I believe that that is in his report.

So, I am not sure that there was a permissive environment in that period of time. I think that what we have done recently, or in the new 5000, is to add—and in other things that we have done—to add additional expectations.

But I would not agree that there was a permissive environment during that period of time. And I think, as I said, there are a number of programs that have not shown cost growth, that were started in that period of time.

Mr. HUNTER. Almost every service acquisition officer who I have talked to in the last—I have only been here for about 2.5 months. But everyone that I have talked to said there was indeed a permissive environment, and that contractors took advantage of it—not necessarily at the big level programs, but down at the lower levels, middle levels, and that that is being reined in now.

And industry is suffering to some extent. The services are having to be more responsible, and DOD is having to be more responsible, too.

Mr. SULLIVAN. One of the comments I would make is that, you know, one of the things that started around, in the 2000 timeframe is when we started having these acquisition programs like Missile Defense Agency (MDA), Future Combat Systems, Joint Strike Fighter. Some of these very, very complex what they call systems of systems, as opposed to just building a weapon system. You had the Future Combat System, which is a—ostensibly, there are 19 programs kind of working within that that somebody is trying to coordinate.

Joint Strike Fighter is three separate fighter aircraft variants that Lockheed Martin is trying to do at one time. There are a lot

of programs out there like that. So, I do not think the government particularly did that very well.

The MDA is an acquisition program. It is an agency. And it has—I do not know the number now, but it is in the teens of highly complex programs that are supposed to work together.

So, I think one of the things that happened is that it got much more complex, so complex that we cannot understand it too well.

And I think the permissiveness, a lot of that might have come from what happened. You know, there was an attempt at acquisition reform in the mid 1990s.

Mr. HUNTER. Well, as complexity goes up, costs go up and everything else goes up.

Mr. SULLIVAN. I think absolutely, yes.

Mr. HUNTER. Let me jump in here, because we have to run.

How do you—and this kind of goes to those mid-level warfighter programs that guys really need, programs like Joint Improvised Explosive Defeat Organization (JIEDDO), Task Force (Odin) and things that we funded, because of immediate current threats that the warfighter has begged for, but that Congress almost has to force on the different services. And these programs start off agile and responsive, and they end up slow, unresponsive, bureaucratic.

And these are all programs where the ongoing operation is just as important as the initial acquisition of them.

And it seems like everything works well when it first starts off. It is lean and mean, and then it kind of gets out of control, once they get their billions and they hire 300 bureaucrats. Everything slows down and they become unresponsive, and they do not necessarily do what they were intended to do in the first place.

But that is more of an ongoing thing, but it still has to do with the initial acquisition and programs not doing what they are supposed to do after the initial acquisition.

How do you fix that?

Mr. AHERN. Well, there are a couple of things that occur to me immediately, congressman. One is the MDA that Mr. Sullivan mentioned a couple of minutes ago. That was initiated, I think, in 2002 timeframe, and is one that had a very near-term expectation that they would develop a capability by—develop and field a capability—by 2004.

And then, as time went—and then continue on. And I think the MDA has a number of elements in development moving toward a block capability that will enable them to expand upon that initial capability.

And what we have done with the MDA is to ensure that they continue to have that Research, Development, Test & Evaluation (RDT&E), or that technology development focus, and move toward transitioning the capabilities that they are developing to the services to operate as rapidly as we can. It requires focus in that area.

Another one that comes to my mind that we are working on now is the Intelligence Surveillance and Reconnaissance (ISR) task force that Secretary Gates started. And that is one that I support from an acquisitions standpoint. And it is absolutely to push ISR resources into the operating areas as quickly as we can.

I expect it to operate for a period of time. I expect to continue to push on it. And the same kind of thing is happening with the MRAP.

And it really is, as—it is up to the people, the discipline that I mentioned earlier on, to have, continue to have that interest in getting the job done to support the warfighter. And I cannot say it any better than that.

We have to do our jobs responsibly to ensure that we do maintain the focus on the urgent operational needs, the support for the warfighters, as I think we are doing in the ISR task force, as we did with the MRAP and continue to support the MRAP, and as we are doing with the MDA. Those are three examples that occur to me.

Mr. ANDREWS. Thank you, Mr. Hunter.

The chair recognizes Mr. Sestak for 5 minutes.

Mr. SESTAK. Thanks, Mr. Chairman.

I honestly believe that the requirement side, particularly since General Cartwright used to have J8, really has come a long way from the Cost Benefit Analysis (CBAs), and the modeling he has done down there. So, I want to focus more on the acquisition side.

But could I ask you, sir, if you could get back to us? My limited understanding is that under Instruction 5000, all the modeling that is used on the requirement side has to go through a validation, verification and analysis by an independent somebody to make sure the models used are well. My understanding is, probably only 5 percent have.

Could you get back to us on that—

[The information referred to can be found in the Appendix on page 80.]

Mr. AHERN. Yes, sir.

Mr. SESTAK [continuing]. Because we are using models in the requirement side that have never been validated. How good are they?

So, I think that is what I would really like to know. My understanding is, even though there is a requirement to in 5000, hardly any of them have. And I think that is something that does not bode for credibility on the modeling being used.

The other side of the acquisition side, I was quite taken by your comments about the Earned Value Management (EVM) program, where we are supposed to forecast final cost. Also, sir, with you, I was taken with how you want to try to establish prerequisite indicators to try to get realistic costs, to kind of break this tyranny of optimism we have.

The other day, when the Littoral Combat Ship (LCS) came forward, initially it was supposed to be \$250 million. Now it is \$460 million. The internal DOD figures only have a 50 percent confidence factor that that is going to be the actual cost.

I guess my point is, we have Nunn-McCurdy. Thirty programs the last three years have come over to us, breaking, breaching Nunn-McCurdy. Nice monitoring system, but no enforcement, no teeth on it.

You mentioned the CAIG, sir. CAIG estimates are not mandatory, yet they turn out to be, by and large, much more right than the services. Should we, A, make the CAIG estimates mandatory?

Number two, shouldn't the Congress have exposure to those confidence factors that you have internally to the services, for example? The aircraft carrier that is going to be built here in a few years is going to cost, according to some estimates, \$13.5 billion. But the internal confidence factor of costing on that is 37 percent.

We are building a lot of Virginia class submarines. But the internal confidence factors on the costing for the Virginia class submarine—two of them being built here in the next years—is less than 50 percent.

Should Congress here have access to that data, so before we commit to something like an LCS, we know at that time maybe that 20 percent confidence factor before we get too far down the road?

Sir.

Mr. AHERN. Sir, taking it in terms of the CAIG being mandatory, I think we need to maintain that balance. The experience that I have is, we tend to use the CAIG estimate for the estimate for the program. But we need to have that dialogue between the CAIG and the service estimate, the program office estimate, because they are different. They are done differently.

And I think that that dialogue is necessary. And if we made the CAIG mandatory, I think that the service cost estimating, which enables that dialogue, would—

Mr. SESTAK. Do you think we should have access to both cost—

Mr. AHERN. Well, I think you should have access to the cost estimates.

Mr. SESTAK. I mean, if they are not an—

Mr. AHERN. I am not sure—

Mr. SESTAK [continuing]. Independent one, like you said, shouldn't Congress know before we dole the national treasure out, what CAIG's estimate is versus the service's, or at least the confidence factor that is coming forward?

Mr. AHERN. I think we do send over the—I mean, the results of that estimating is done in the Acquisition Program Baseline (APB) that is reported in the Selected Acquisition Report (SAR) reports for the programs.

So, I think that the results of that work is absolutely reported to you in the SARs that come over on all the major programs when they initiate them at a program milestone. I really do think it is there.

Mr. SESTAK. All right. I probably missed it.

May I ask another question? I think my time—oh, I have time for one more.

My question is on the more jointness. I was always quite taken with what Representative Skelton and many did with the JCS, you know, with having—back in the Goldwater-Nichols day, when the chairman walked in after that was passed, everybody else stood up. Before that, the JCS would not stand up when he walked in the room, because he was one of equals.

To some degree, do you think, as we have a wonderful system, including having OSD involved in the JCIDS process now, which it was not before—I mean, a few years ago they were brought in—do you think that we need to structure the JROCs, but not so much as what we did to the JCS, so it is not everybody is equal there?

You may get the least common denominator. It is my program versus your program.

But do we need a Goldwater II, in a sense, to say there should be one final requirements guy before it goes any further, rather than least common denominator. Any comments?

Mr. SULLIVAN. Well, my comment on that is that, you know, Goldwater-Nichols was to make jointness. And it did it on the operations side, I think. You know, if we see the way—

Mr. SESTAK. But not the procurement side.

Mr. SULLIVAN. Not the procurement side. So, there, I think you raise a really excellent point.

These programs have to be acquired jointly, and they are not right now. There is still too much service-centricity, even in the JCIDS process, which, when you read the JCIDS policy, it is really pretty good policy.

Mr. SESTAK. It is.

Mr. SULLIVAN. It establishes functional capability boards and a lot of joint matrix processes that are supposed to look at requirements and weigh in in a purple-suited way, if you will.

Those things are not in effect right now. They have not staffed them properly.

I think you still—I do not think that the policy has been implemented well.

Mr. SESTAK. I am out of time. But my only thing is, when it finally gets to the JROC, it is wonderful work up till there. But that final decision, I just do not know if you need to change it like the JCS—

Mr. SULLIVAN. Yes, if I could just comment briefly on one other thing you were talking about, the CAIG estimates.

We have done a lot of work in that area. And we found that the CAIG usually has a little bit better accurate estimate, but still, far from what the outcomes usually tend to be. And the department does not always accept those estimates.

And I think that an independent CAIG would be something that might be helpful to the Congress, something similar to how they do Director of Operational Test & Evaluation (DOT&E). They established an independent director. I think that is something that might be helpful.

Mr. AHERN. I would like to go back and comment on Mr. Sullivan's last comment. I think that the more we emphasize that need to do the work prior to beginning a program, the product development, we will have a far better informed, independent as a well as a service estimate.

So, I do not think the answer, sir, is structurally to set up an independent CAIG or to do something along those lines. I think it is to ensure that we have more information on the products before we get into the product development.

The competitive prototyping, the insistence upon technology maturity are the kinds of information that we need to have. Otherwise we are using old information, parametrics. Well, we did it this way a couple of years ago, so we will use that kind of way. Or circuit boards cost \$1.98 in 2005, so assume they cost \$1, you know, \$2.05. We need to have better information than that.

That is why I think, yes, the CAIG estimate, the service estimates are critically important. But to improve them, what we need to do is improve the information that goes into them.

Mr. SULLIVAN. But in order to improve that information, you might need an independent assessor overseeing all that——

Mr. SESTAK. You could be joined and do both.

Mr. SULLIVAN. This could be a chicken and egg thing. I do not know.

Mr. ANDREWS. I would like to thank Mr. Sestak, particularly for the observation about the dichotomy between the jointness in operations——

Mr. SULLIVAN. Yes.

Mr. ANDREWS [continuing]. But the lack of jointness in procurement. I think it is a very critical point——

Mr. SULLIVAN. Yes, very——

Mr. ANDREWS [continuing]. That goes to a lot of what Mr. Ahern and Mr. Sullivan said. Thank you.

I am going to ask if Mr. Conaway has any concluding remarks.

Let me also mention that, if any member of the panel would like further analysis or questions, please submit them in writing. I am sure the witnesses would comply with a written answer.

Mr. Conaway.

Mr. CONAWAY. Well, witnesses, thank you very much for coming this morning at an unusual hour for a hearing like this. I appreciate that.

I would like to follow up with you with respect to these CAIG estimates and the ones that are actually used, and what requirement there is for reconciling the differences between the two on the front end.

Mr. CONAWAY. And then, Mr. Sullivan, you may have some historical data about tracking reasonable estimates, CAIG estimates and reality.

Mr. SULLIVAN. Yes, I do.

[The information referred to can be found in the Appendix beginning on page 78.]

Mr. CONAWAY. It might be helpful for us to look at it.

But in closing, it is actually the panel's responsibility to find legislative issues that need to be addressed on a go-forward basis. So, if there is legislation that you see is needed to help what we are trying to do and trying to accomplish, which I think all of us have the exact same goal, please point that out to us, as well, because that is really the goal of what we are trying to get done.

Chairman, thank you.

Mr. ANDREWS. Thank you.

I would like to thank the witnesses for their outstanding preparation. We are going to call on you as the process goes forward, I am sure.

There are two items I would ask you to supplement the record with.

Mr. Ahern, I am interested in your views on how we might eliminate the wiggle room that has been identified in the 5000 guidance. I know you are working very avidly on that. We would be interested in your direction to us on how that process can be sharpened

and improved. I thought your comments this morning were very edifying.

[The information referred to can be found in the Appendix on page 77.]

Mr. Sullivan, I would like your views on the question of the SARs. The selective acquisition reports that come over are an excellent tool for the Congress to evaluate problems. As I understand it—and correct me if I am wrong—I think all the SARs come post-milestone B. Am I right about that?

Mr. SULLIVAN. Yes.

Mr. ANDREWS. Yes. I am interested in whether there is a similar analytical tool that could be created by legislation pre-milestone B, so that we could get an early warning signal that there is something wrong in the design phase.

Now, I understand it is a whole different set of questions, but I think that a SAR-type tool pre-milestone B would be very useful for us. I would be interested in your thoughts.

And you, as well, Mr. Ahern.

[The information referred to can be found in the Appendix beginning on page 77.]

Mr. AHERN. All right.

Mr. ANDREWS. The committee is going to—the panel is going to proceed after we return from the recess with another hearing. We will be consulting with the minority as to what the topic ought to be with respect to that.

I am confident that we are going to broaden the issue of defining what I began this morning talking about, the delta, the gap between what we are paying for and what we are getting, beyond the issue of the major weapons systems, as well. I think we have had an excellent discussion of that subject, but we want to go beyond that to the budget, the huge—the majority of the procurement budget that is not major weapons systems.

You have given us some very sobering news this morning, nearly \$300 billion in overruns. And I think the good news we hear is that there are tools in place for us to understand the causes of these problems, which then gives us the ability to find solutions.

What is disturbing, of course, is that the trending is in the wrong direction. If you look at the difference between 2003 and 2008, I think your data are accurate. The problem is getting worse and not better. And I think that goes to Mr. Conaway's point, and Mr. Cooper's point earlier. You know, the ream upon ream of assessment of this has gotten us nowhere—worse than nowhere.

So, we are interested in trying to put teeth into the decision-making process in a way that makes this work.

Again, the record will be open for any member to submit more questions to the panel.

We thank both panelists for excellent presentations this morning, and we stand adjourned.

[Whereupon, at 8:54 a.m., the panel was adjourned.]

A P P E N D I X

APRIL 1, 2009

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

APRIL 1, 2009

Prepared Remarks of Chairman Rob Andrews
Panel on Defense Acquisition Reform
Hearing on Measuring Value and Efficiency: How to Assess the Performance of the Defense
Acquisition System
April 1, 2009

Welcome everyone to today's hearing on measuring the performance of the defense acquisition system. Our witnesses today are Mr. David G. Ahern, the Director of Portfolio Systems Acquisition in the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, and Mr. Michael J. Sullivan, Director for Acquisitions and Sourcing Management at the Government Accountability Office.

Today is the panel's first hearing, and we expect it to be the first of many as we proceed to examine the questions outlined in the committee's work plan. Our first question is a fundamental one: how do we measure how well the defense acquisition system is performing? We all have our own individual judgments of this question, and it would be unlikely that the panel would exist if not for a general understanding that the system often does not perform well. But I think it is nonetheless essential to determine whether there are solid, objective measures of to what extent and how we believe the system may be failing.

We often criticize the executive branch, regardless of the issue or the agency, when we believe that it has not set clear priorities or established clear benchmarks and metrics to measure performance. I believe we should live by the same standard. It is my hope that as part of the panel's work we can measure the shortcomings in the defense acquisition system or at least put the Department of Defense on a path to establish its own measure. I'm not sure we will know the answer to this question at the end of today's hearing, but hopefully we'll have made a lot of progress. I thank the witnesses in advance for their excellent testimony and for their willingness to join us at this rather early hour.

I now turn to Mr. Conaway for any remarks he would like to make.

Statement of Ranking Member Conaway
Hearing of the
Defense Acquisition Reform Panel
on
Measuring Value and Efficiency: How to Assess the
Performance of the Defense Acquisition System

April 1, 2009

Good morning, Mr. Chairman, ladies and gentlemen. I think it's appropriate for the Panel's first hearing that we have a senior member of the defense acquisition system and GAO's senior acquisition management professional sitting side by side. It's not often that members of this committee get a chance to talk to the Department and GAO at the same time. Thank you, gentlemen, for making this possible and agreeing to be with us at such an early hour.

The first question this panel identified as part of its work plan was whether there is a method to reasonably measure the ability of the defense acquisition system to deliver the goods and services needed by

the warfighter, to do so in a timely fashion, and to do so at a fair price. Today's hearing will likely not answer the larger philosophical question about how one measures value in defense acquisition, but it is an important first step for us to understand how DoD and GAO currently assess performance in one segment of defense acquisition – the major weapons systems programs that were a focus of the assessment GAO released this week.

These programs receive a great deal of scrutiny by Congress and by the media for good reason. GAO's report reveals that nearly 70 percent of DoD's 96 largest weapons programs were over budget \$296 billion, or nearly 42 percent. This is simply unacceptable. Everybody understands why we cannot continue to tolerate these cost increases – there is little more to be said on the subject. But what we don't hear as much about, is that GAO had encouraging words to say about steps the Pentagon has taken to improve acquisition outcomes, including early stage systems engineering, prototyping, measurable yearly plans,

increasing accountability, and minimizing requirements creep. The report states, "These changes are consistent with the knowledge-based approach to weapons development that we have recommended in our work. If implemented, these changes can help programs to replace risk with knowledge, thereby increasing the chances of developing weapon systems within cost and schedule targets while meeting user needs...These are encouraging signs, but to improve outcomes on the whole, DoD must ensure that these policy changes are consistently implemented and reflected in decisions on individual programs." I hope we hear more today about these positive improvements that DoD is making, and what more needs to be done.

Of course, we are likely to learn that much of what DoD does to measure performance is already statutorily required. I also hope our witnesses feel free to share their views on laws and regulations that are not assisting in their efforts to obtain the best value and capability for

our warfighters. There is a balance to be struck between setting high expectations and over regulating the system.

With that I will conclude and again thank my fellow members and you, Mr. Chairman. I look forward to the witnesses' testimony.

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ON ARMED SERVICES
ACQUISITION REFORM PANEL**

STATEMENT OF

MR DAVID G. AHERN

**DIRECTOR, PORTFOLIO SYSTEMS ACQUISITION
OFFICE OF THE UNDER SECRETARY OF DEFENSE
(ACQUISITION, TECHNOLOGY, AND LOGISTICS)**

BEFORE THE

HOUSE ARMED SERVICES COMMITTEE

ACQUISITION REFORM PANEL

April 1, 2009

**FOR OFFICIAL USE ONLY
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ON ARMED SERVICES
ACQUISITION REFORM PANEL**

**Measuring Value and Efficiency: How to Assess the Performance of the
Defense Acquisition System**

**Mr. David G. Ahern
Director, Portfolio Systems Acquisition
Office of the Under Secretary of Defense
(Acquisition, Technology, and Logistics)**

Good morning Chairman Andrews, Congressman Conaway, and Members of the Panel. Thank you for the opportunity to appear before you today to discuss how the Department of Defense assesses the performance of the Defense Acquisition System.

Any attempt to measure the return on the taxpayer's dollar that we are achieving in the acquisition system must be viewed from both strategic and tactical perspectives. In doing so, we must be prepared to answer a number of questions. For example:

- a. Has the Department made the optimal investment decisions when deciding what weapon system programs to develop and field?
- b. Has the Joint Staff established appropriate requirements through the Joint Capabilities Integration and Development System (JCIDS)?
- c. Has the Department fully funded its weapons systems at initiation through the Planning, Programming, Budgeting, and Execution System (PPBES)?
- d. Has the Department, using DoD Instruction 5000.2 which guides the acquisition process itself, ensured that new programs have a solid foundation in terms of technology maturity, cost estimates, systems engineering processes, etc., at the time they are initiated?

e. Is the acquisition community disciplined in its execution of our programs, taking prudent steps to control requirements changes that might drive up cost or delay schedules? And are we continuously looking for ways to reduce cost or unnecessary requirements both in individual programs and across all our major defense acquisition programs?

f. Are we using all the tools in our toolkit to drive positive outcomes? For example are we writing contracts that reward only good performance? Have we empowered our acquisition program managers to be proper stewards of taxpayer dollars? Are contractors' earned value management systems collecting the right information at the right time to warn of poor execution? Is the acquisition workforce large enough, with the proper training and experience, to properly oversee our programs?

g. For programs that do experience cost growth, how does the Department decide whether to continue, modify, or terminate the program?

Determining the "Best Value" Acquisition Solution for the Warfighter

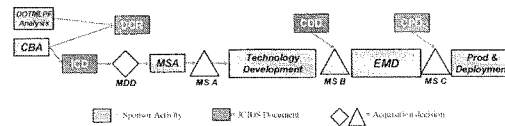
To address the question of whether we are making the right investment decisions, the Department uses Capability Portfolio Management (CPM). CPM advises the Deputy Secretary and the Heads of the DoD Components on how to optimize capability investments across the defense enterprise (both materiel and non-materiel) and minimize risk in meeting the Department's capability needs in support of strategy. Under CPM, recommendations are made regarding integration, coordination, and synchronization of capability requirements to capability investments. It is used to evaluate capability

demand (both warfighting and non-warfighting) against resource constraints, to identify and assess risks, and to suggest capability trade-offs.

The Joint Staff's Joint Capabilities Integration and Development System (JCIDS) process was created to support the statutory requirements of the JROC to validate joint warfighting requirements. JCIDS, shown pictorially below, is a key supporting process for DOD acquisition and PPBE processes, with the primary objective to ensure the joint warfighter receives the capabilities required to successfully execute the missions assigned to them. When a Service or agency determines that they may have an issue, they perform a capabilities-based assessment to identify: the capabilities (and operational performance criteria) required to successfully execute missions; the shortfalls in existing weapon systems to deliver those capabilities and the associated operational risks; and the possible non-materiel solutions or the need for materiel solutions for the capability shortfalls. The results are documented in an Initial Capabilities Document which, upon approval, validates the capability need and supports two alternative processes. First, it can support the development and implementation of a non-materiel solution. Second, it can support the initiation of the acquisition process, through a Materiel Development Decision, to identify and develop a materiel solution.

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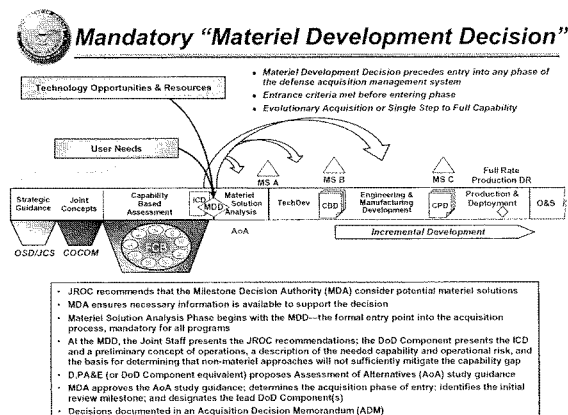
JCIDS and Acquisition



CBA = Capabilities Based Assessment
MDD = Materiel Development Decision
MSA = Materiel Solutions Analysis
EMD = Engineering & Manufacturing Development

UNCLASSIFIED 6

When the ICD demonstrates the need for a materiel solution, the JROC shall recommend that the Milestone Decision Authority (MDA) consider potential materiel solutions. The MDA, working with appropriate stakeholders, shall determine whether there is sufficient information to proceed with a Materiel Development Decision (MDD). The MDD, described below, begins the Materiel Solution Analysis Phase and represents the formal entry point into the acquisition process. It is mandatory for all programs.



At the MDD review, the Joint Staff shall present the JROC recommendations and the DoD Component shall present the ICD including: the preliminary concept of operations, a description of the needed capability, the operational risk, and the basis for determining that non-materiel approaches will not sufficiently mitigate the capability gap.

The Director, Program Analysis & Evaluation (DPA&E) proposes study guidance for the Analysis of Alternatives (AoA). The AoA focuses on identification and analysis of alternatives, measures of effectiveness, cost, schedule, concepts of operations, and overall risk. The AoA also assesses the critical technology elements associated with each proposed materiel solution, including technology maturity, integration risk, manufacturing feasibility, and, where necessary, technology maturation and demonstration needs. To achieve the best possible system solution, emphasis is placed on innovation and competition, but it is important to emphasize that the AoA examines the full spectrum of alternatives; starting with current capability and moving to an entirely new materiel solution with the goal of balancing the capability needs, with what the Department can effectively acquire and afford to achieve the best value proposition for our Nation.

The Materiel Solution Analysis Phase ends when the AoA has been completed, materiel solution options for the capability need identified in the approved ICD have been recommended by the lead DoD Component conducting the AoA, and the phase-specific entrance criteria for the initial review milestone have been satisfied. After a Milestone A review, the program moves to the Technology Development phase.

The purpose of the Technology Development phase is to reduce technology risk, determine and mature the appropriate set of technologies to be integrated into a full system, and to demonstrate critical technology elements on prototypes. I would note that if, during Technology Development, the cost estimate upon which a Milestone A certification was based increases by 25 percent or more, the MDA must consult with the JROC to determine whether the resources required to develop and procure the system remains consistent with the priority level assigned by the JROC. If not, the MDA may rescind the Milestone A approval.

During the Technology Development phase, the strategy and associated funding provides for two or more competing teams producing prototypes of the system and/or key system elements prior to, or through, Milestone B. Prototype systems or appropriate component-level prototyping are employed to continue reduction of e technical risk, validate designs and cost estimates, evaluate manufacturing processes, and refine requirements, again with the goal of ensuring the acquisition enterprise pursues the best value solution to meet warfighter needs.

The project exits the Technology Development Phase when an affordable program or increment of militarily useful capability has been identified; the technology and manufacturing processes for that program or increment have been assessed and demonstrated in a relevant environment; manufacturing risks have been identified; a system or increment can be developed for production within a short timeframe (normally less than 5 years for weapon systems); or, when the MDA decides to terminate the effort. During Technology Development, the user prepares the Capability Development

Document (CDD) to support initiation of the acquisition program or evolutionary increment, refine the integrated architecture, and clarify how the program will lead to joint warfighting capability. The CDD, informed by technology maturity, life cycle cost, and schedule considerations, builds on the ICD and provides the detailed operational performance parameters necessary to complete design of the proposed system.

Executing the “Best Value” Program

The Acquisition Program Baseline is the key document for program management. It reflects the approved program being executed. It is the “Baseline Description” of the program and includes sufficient parameters to describe the cost estimate (also referred to as the “Baseline Estimate” for major defense acquisition programs), schedule, performance, supportability, and other relevant factors. The APB becomes the source document when determining whether a program has committed a “Nunn-McCurdy” breach for cost or schedule. The first APB is approved by the MDA prior to entry into EMD. A Milestone B decision follows the completion of Technology Development and, where successful, marks the start of the Engineering and Manufacturing Development (EMD) phase.

The purpose of the EMD Phase is to develop a system or an increment of capability; complete full system integration (technology risk reduction occurs during Technology Development); develop an affordable and executable manufacturing process; ensure operational supportability with particular attention to minimizing the logistics footprint; implement human systems integration; design for producibility; ensure affordability; protect critical program information by implementing appropriate

techniques such as anti-tamper; and demonstrate system integration, interoperability, safety, and utility. Transition into EMD requires full funding (i.e., inclusion of the dollars and manpower needed for all current and future efforts to carry out the acquisition strategy in the budget and out-year program), which is programmed in anticipation of the Milestone B decision. The CDD, Acquisition Strategy, Systems Engineering Plan, and Test and Evaluation Master Plan (TEMP) guide the EMD phase.

The Acquisition Strategy describes how the PM plans to employ contract incentives to achieve required cost, schedule, and performance outcomes. EMD effectively integrates the acquisition, engineering, and manufacturing development processes with Test and Evaluation (T&E). T&E is conducted in an appropriate continuum of live, virtual, and constructive system and operational environments. Developmental and operational test activities are integrated and seamless throughout the phase. The SEP describes the program's overall technical approach, including key technical risks, processes, resources, metrics, and applicable performance incentives. It also details the timing, conduct, and success criteria of technical reviews.

Successful completion of the EMD phase leads to a Milestone C decision and entrance into the Production and Deployment Phase. The purpose of the Production and Deployment Phase is to achieve an operational capability that satisfies mission needs. Operational test and evaluation determines the effectiveness and suitability of the system. The MDA makes the decision to commit the Department of Defense to production at Milestone C. Milestone C authorizes entry into Low Rate Initial Production (LRIP) for major defense acquisition programs, into production or procurement (for non-major

systems that do not require LRIP), or into limited deployment in support of operational testing for major automated information systems or software-intensive systems with no production components.

LRIP is intended to result in completion of manufacturing development in order to ensure adequate and efficient manufacturing capability and to produce the minimum quantity necessary to provide production or production-representative articles for operational test and evaluation, establish an initial production base for the system; and permit an orderly increase in the production rate for the system, sufficient to lead to full-rate production upon successful completion of operational (and live-fire, where applicable) testing.

Continuation into full-rate production results from a successful Full-Rate Production Decision Review by the MDA. This effort delivers the fully funded quantity of systems and supporting materiel and services for the program or increment to the users. During this effort, units will typically attain Initial Operational Capability (IOC).

Throughout the acquisition process, the Department uses a variety of program and technical reviews to assess program status and for decision making purposes. Among these reviews are the Defense Acquisition Board (DAB) reviews. The DAB advises the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)) on critical acquisition decisions. The USD(AT&L) chairs the DAB. Configuration Steering Boards (CSBs) meet at least annually to review all requirements changes and any significant technical configuration changes for major defense acquisition programs in development that have the potential to result in cost and schedule impacts to the program.

Such changes will generally be rejected, deferring them to future blocks or increments. Changes are not approved unless funds are identified and schedule impacts mitigated. Program Support Reviews are a means to inform an MDA and Program Office of the status of technical planning and management processes by identifying cost, schedule, and performance risk and recommendations to mitigate those risks. Defense Acquisition Executive Summary (DAES) reviews. The DAES provides an early-warning report to USD(AT&L) and ASD(NII). The DAES describes actual program problems, warns of potential program problems, and describes mitigating actions taken or planned. At minimum, the DAES should report program assessments (including interoperability), unit costs, and current estimates.

In addition to program-level assessments, the Department uses quantitative tools to assess contract performance. Earned Value Management (EVM) is a widely accepted industry best practice for project management that is used not only in DoD, but other Federal government agencies as well. It is an integrated management system that coordinates the work scope, schedule, and cost goals of a program or contract, and objectively measures progress toward these goals. EVM is a tool used by program managers to: (1) quantify and measure program/contract performance, (2) provide an early warning system for deviation from a baseline, and (3) provide a means to forecast final cost and schedule outcomes.

The overview provided here is focused on major defense acquisition programs and reviews conducted by the Office of the Secretary of Defense. However, the Military Departments apply the same principles and processes to smaller programs that do not

reach the threshold of a major defense acquisition program. In addition, there are similar processes for information systems and processes to address unique activities, such as for missile defense. In each case, however, analogous processes and procedures provide the Department the information needed to decide when and whether to commit resources and to oversee program execution.

The recent issuance of the new DoD Instruction 5000.2 results in the implementation of many initiatives aimed at ensuring programs are started with a solid foundation, are focused on disciplined execution, and deliver capability to the warfighter within cost and schedule parameters. It will take time for us to fully realized the benefit of these policy initiatives. However, we will continue to look for opportunities to improve the Defense Acquisition System. I look forward to forward to answering any questions you might have.

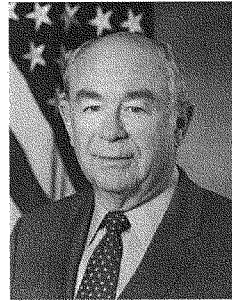


ACQUISITION & TECHNOLOGY

THE WILL TO CHANGE

David G. Ahern

Director, Portfolio Systems Acquisition



As the Director for Portfolio Systems Acquisition, Mr. David Ahern is responsible for providing portfolio management, technical and programmatic evaluation and functional oversight. His office sustains Department of Defense (DoD) strategic and tactical programs in support of the Under Secretary of Defense for Acquisition, Technology and Logistics (AT&L) and the Deputy Under Secretary of Defense for Acquisition and Technology (A&T).

Mr. Ahern was previously Professor of Program Management and Director of the Center for Program Management at the Defense Acquisition University (DAU) at Fort Belvoir, VA. While at DAU, Mr. Ahern also served as an Executive Course Learning Team Mentor and Instructor at the Defense System Management College School of Program Management. Mr. Ahern has also held business development, program management, and business unit positions in the development of tactical information systems with General Dynamics Information Systems Company and the Northrop Grumman Electronics System Sector.

A native of Connecticut, Mr. Ahern was a career Naval Officer and is a graduate of the Naval Academy in Annapolis, MD. He is also a graduate of the Navy Postgraduate School and Defense Systems Management College. Mr. Ahern's sea duty was as a Naval Aviator in the RA5C Vigilante during multiple deployments to the Pacific and Atlantic Oceans and as Executive and Commanding Officer of Tactical Electronic Warfare Squadron Thirty Three (VAQ-33). Ashore, he was Head, Tactical Command and Control Branch on the staff of the Chief of Naval Operations; Project Officer in the Navy Space Project (PM-16); Class 2 Program Manager at the Joint JTHDS Program Office (ESD-TD); Program Manager Navy Tactical Data Link Systems (PMW/PMA 159); and Deputy Program Executive Office Space, Communications and Sensors (PEO-SCS).



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Reform, Committee on Armed Services,
House of Representatives

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DEFENSE ACQUISITIONS

Measuring the Value of DOD's Weapon Programs Requires Starting with Realistic Baselines

Statement of Michael J. Sullivan,
Director Acquisition and Sourcing Management



GAO-09-543T

GAO
Accountability Integrity Reliability
Highlights

Highlights of GAO-09-543T, a testimony before the House Committee on Armed Services Panel on Defense Acquisition Reform.

Why GAO Did This Study

In 2008, the cumulative cost growth in the Department of Defense's portfolio of 96 major defense acquisition programs was \$296 billion and the average delay in delivering promised capabilities to the warfighter was 22 months.¹ These poor outcomes mean that other critical defense and national priorities may go unfunded and that warfighters may go without the equipment they need to counter the changing threats that they face.

GAO has examined extensively the issues in DOD's weapon system programs from the perspective of best practices in product development, and believes that significant improvements are possible. Because the ability to measure knowledge, processes, and outcomes is critical to achieving these improvements, GAO has used metrics to review the management and health of these programs from within the framework of best practices.

This testimony discusses: 1) "knowledge metrics," used to determine how well programs manage technology, design, and manufacturing risks; 2) outcome metrics—concerning cost, schedule, and capability—that serve as "health indicators" of how well programs are being executed in terms of predicted outcomes; and 3) the prerequisites that GAO believes must be met in order for a program's plans and goals to be realistic.

View GAO-09-543T or key components. For more information, contact Michael J. Sullivan at (202) 512-4841 or sullivanm@gao.gov.

April 1, 2009

DEFENSE ACQUISITIONS

Measuring the Value of DOD's Weapon Programs Requires Starting with Realistic Baselines**What GAO Found**

GAO employs a set of knowledge metrics to determine whether programs have attained the right knowledge at critical points over the course of a weapon system acquisition, and facilitate the identification of potential problems that could lead to cost, schedule, or performance shortfalls. In essence, knowledge supplants risk over time. Key knowledge points and metrics include 1) achieving a high level of technology maturity at the start of program development, 2) reaching design stability at the system-level critical design review, and 3) demonstrating that critical manufacturing processes are in control before starting production. By applying these metrics to selected programs in DOD's 2008 portfolio of major defense acquisitions, GAO found that most programs have started system development without mature technologies and moved into system demonstration with low levels of design stability. GAO has determined that programs with immature technologies and unstable designs have experienced significant cost and schedule growth.

Program outcome metrics—quantitative measures of cost, schedule, and performance over time—provide useful indicators of the health of acquisition programs and whether they are meeting their intended goals. When assessed regularly for changes and the reasons that cause changes, these indicators can be valuable tools for improving insight into and oversight of individual programs as well as DOD's total portfolio of major defense acquisitions. The collective performance of the programs in DOD's portfolio is a key indicator of how well the acquisition system generates the return on investment that it promises to the warfighter, Congress and taxpayers. GAO recently reported that outcome metrics for DOD's 2008 major defense acquisition portfolio show worsening performance when compared to the department's 2003 portfolio. For example, total acquisition costs for programs in the 2008 portfolio increased 25 percent from first estimates compared to a 19-percent increase for programs in the 2003 portfolio. DOD is working with GAO and the Office of Management and Budget to develop a comprehensive set of outcome metrics to better assess its portfolio of programs.

While knowledge and outcome metrics provide valuable information about the potential problems and health of programs, they are of limited value if DOD does not do a better job ensuring acquisitions begin with realistic plans and baselines prior to development start. GAO believes there is a clear set of prerequisites that must be met by each program's acquisition strategy before a measurement of the program's health will be of real value. These prerequisites include: 1) establishing an evolutionary, knowledge-based business case for each acquisition; 2) separating technology development from product development; 3) limiting time and requirements for product development to manageable levels; 4) employing systems engineering early on in the process to arrive at realistic cost and schedule estimates; 5) committing to fully funding a program once it is approved; and 6) setting priorities from the top to ensure that candidate programs are truly needed and have a solid plan for delivery.

Mr. Chairman and Members of the Committee:

I am pleased to be here this morning to discuss how best to measure and determine whether DOD's acquisition system is providing value to the warfighter. Earlier this week, we reported that the cumulative cost growth in DOD's portfolio of 96 major defense acquisition programs was \$296 billion and the average delay in delivering promised capabilities to the warfighter was 22 months. These outcomes mean that other critical defense and national priorities go unfunded and warfighters go without the equipment they need to counter ever changing threats that they face. This condition is unacceptable. We believe that significant improvement in the acquisition of weapon systems is possible and that the ability to measure knowledge, processes, and outcomes is critical to achieving that improvement. It is important to note that not one single metric or set of metrics is enough to monitor acquisitions and gain efficiencies. Today, we would like to break our discussion about how to measure the department's acquisitions into 3 basic sections:

- First, we would like to present a set of metrics that we refer to as "knowledge metrics" and use to determine how well acquisition programs are managing and retiring predictable technology, design, and manufacturing risks and gaining knowledge. These metrics are valuable because they can predict problems and identify causes.
- Second, we would like to discuss a set of outcome measures—concerning cost, schedule, and capability—that serve as health indicators. These indicators measure how well programs are being executed and achieving predicted outcomes in terms of meeting original baselines for cost, schedule, and performance. These metrics have intrinsic value as simple measurements, just as a thermometer can warn a parent that a child has a fever.
- Third, there are certain indicators that we look for—based on the work we have done examining best practices for product development—that are, perhaps, more important than these knowledge and health metrics because they determine from the outset how realistic the acquisition plans and strategies of programs are. For the sake of today's discussion, we will refer to them as "prerequisite indicators." These prerequisites are most important because we question the value of ANY metric when measuring from an unrealistic baseline.

We know that the knowledge and program health metrics we use to measure programs' progress and outcomes are valuable when used in realistic, market-driven product development environments. We also know

that ALL of these metrics are important indicators for decision makers. Our extensive body of work examining world-class enterprises and the way they operate has validated their value for programs that must deliver a new product to market at a certain time and within a certain investment cost or suffer significant consequences. These metrics work because they are measuring realistic plans and goals that are supported by doable requirements, accurate cost and schedule estimates, and stable funding. The company developing the products suffers dire consequences, such as loss of market share, if these programs do not succeed.

This statement draws from our extensive body of work on DOD's acquisition of weapon systems. A list of our key products is provided at the end of this statement. This work was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

"Knowledge" Metrics Identify Potential Problems and Their Likely Causes

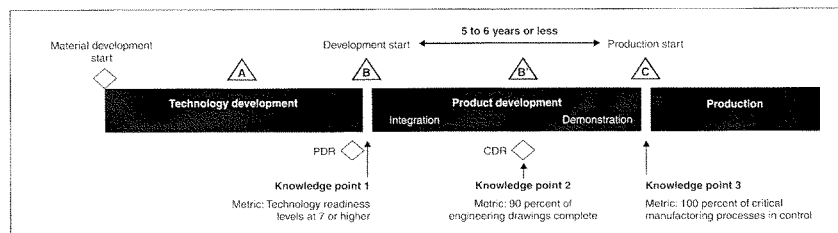
We have conducted a body of work that examines weapon acquisition issues from a perspective that draws upon lessons learned from best practices in product development. Collectively, these practices comprise a process that is anchored in knowledge. Achieving the right knowledge at the right time enables leadership to make informed decisions about when and how best to move into various expensive acquisition phases. In essence, knowledge supplants risk over time. This building of knowledge consists of gathering information about technology, design, and manufacturing at three critical points over the course of a weapon system program (Figure 1). We have developed valuable "knowledge metrics" that measure this knowledge build and allow us to identify potential problems that could lead to cost, schedule, or performance shortfalls and their likely causes. The metrics can be described as

- *Knowledge Point 1*, evidenced by the balance between a product's required capabilities and the resources available to meet them. Focus should be on understanding technological and design implications and achieving a high level of technology maturity at the start of system development. This means that the critical technologies needed to meet essential product requirements must be demonstrated to work in their

intended environment. The technology readiness level for each critical technology is the metric we use to measure technology maturity.¹

- *Knowledge point 2*, evidenced by the development of engineering prototypes and the completion of engineering drawings for an integrated product at the system design review. This metric provides tangible evidence that the product's design is stable, meaning it has a high probability of meeting customer requirements, as well as cost, schedule, and reliability targets. A best practice is to achieve design stability at the system-level critical design review, usually held midway through development. Completion of at least 90 percent of engineering drawings is the metric we use to measure design stability.
- *Knowledge point 3*, evidenced by the demonstration that critical manufacturing processes are in control—that is, they are repeatable, sustainable, and capable of consistently producing parts within the product's quality tolerances and standards—at the start of production. One hundred percent of critical manufacturing processes in control is the metric we use to evaluate manufacturing maturity.

Figure 1: Knowledge-Based Acquisition Process



Source: GAO analysis of commercial best practices.

Each of these metrics gauges the point when the requisite level of knowledge has been attained for a product in relation to where that

¹ Technology readiness levels, originally developed by the National Aeronautics and Space Administration, are measured on a scale of 1 to 9, beginning with paper studies of a technology's feasibility and culminating with a technology fully integrated into a completed product. See Attachment 2 for the definitions of technology readiness levels.

product is in its development. World-class firms we have visited work hard to establish metrics such as these and their decision makers are required to consider them before deciding to advance a program to the next level. These types of metrics also help decision makers gauge progress in meeting cost, schedule, and performance goals and ensure that managers will (1) conduct activities to capture relevant product development knowledge, (2) provide evidence that this knowledge has been captured, and (3) hold decision reviews to determine that appropriate knowledge has been captured before moving the product to the next phase. The result is a product development process that provides critical measurements of knowledge, holds decision makers accountable, and delivers the expected results in a predictable manner. Attachment 1 to this statement provides a detailed list of activities that would provide program managers with the requisite technology, design, and manufacturing knowledge at key points in time during development.

We have used these metrics to identify problems on major weapon system acquisition programs and have found a strong correlation between each of them and cost and schedule outcomes. For example, for 47 weapon programs in DOD's 2008 portfolio of major defense acquisitions, we assessed the knowledge attained at key decision points in the acquisition process and found the following:⁴

- Most programs have started system development without mature technologies. Only 4 of the 36 programs that provided data on technical maturity at development start did so with fully mature critical technologies. Further, only 14 of 39 programs that provided data have or plan to have demonstrated all of their technologies in a realistic environment prior to system-level critical design review, at which point the system's design should be stable. The 5 newer programs—those initiated since 2003⁵—have higher levels of technology maturity, with all 5

⁴We did this by collecting data directly from program offices using a questionnaire. These programs are primarily in development and, therefore, most relevant to current decisions about which programs should receive substantial investments of research and development funding now and large amounts of procurement funding in the future. *Defense Acquisitions: Assessment of Selected Weapons Programs*. GAO-09-326SP. Washington, D.C.: March 30, 2009.

⁵In 2003, DOD revised its primary acquisition policy to state that technologies should be demonstrated in a relevant environment prior to starting an acquisition program. In 2006, this standard became a statutory requirement for all major defense acquisition programs in the National Defense Authorization Act for Fiscal Year 2006, Pub. L. No. 109-163, § 801, codified at 10 U.S.C. § 2366b.

programs demonstrating their technologies in a relevant environment prior to development start, in accordance with DOD and statutory criteria. However only 1 of these programs met the best practice standard of demonstrating critical technologies in an operational environment. Last year, we determined that programs with immature technologies at the start of system development experienced 44 percent higher cost growth than programs that began with mature technologies.

- Programs that have held design reviews in recent years reported higher levels of design knowledge. However, designs, on average, are still far from stable. For the 24 programs in our assessment that held a critical design review since 2003, the average percentage of total expected design drawings releasable at this review was 65 percent, compared to a best practice standard of 90 percent. We have found that programs moving forward into system demonstration with low levels of design stability are more likely than other programs to encounter costly design changes and parts shortages that, in turn, cause labor inefficiencies, schedule delays, and quality problems.

Attachment 3 represents our notional depiction of the problems and outcomes that can typically be expected when these knowledge metrics are followed versus when they are not. Generally speaking, programs that move forward without retiring technology, design, and manufacturing risk at appropriate junctures will encounter a cascade of problems beginning with design changes and continuing with parts shortages, changes to manufacturing processes, labor inefficiencies, and quality problems. All of these problems delay programs and add to their development costs. We have found, for example, that a significant portion—about 70 percent—of the total development cost growth in programs typically occurs after the design review.

Outcome Metrics Provide Insight into the Health and Performance of Individual Weapon System Programs and DOD's Total Portfolio

Program outcome metrics—quantitative measures of cost, schedule, and performance, and changes in these factors over time—provide useful indicators of the health of acquisition programs and facilitate analyses of how well programs are meeting cost, schedule, and performance goals. When assessed regularly for changes and the reasons that cause changes, such indicators can be valuable tools for improving insight and oversight of individual programs as well as DOD's total portfolio of major defense acquisitions. Over the years we have reported cost, schedule and performance data—good and bad—on numerous weapon systems. Our work continues to identify systemic and program-specific causes for cost, schedule, and performance problems and has led us to designate, since

1990, DOD's management of major weapon system acquisitions as a high risk area.

To improve acquisition performance and address the factors that keep weapon acquisitions on the high risk list, DOD is working with us and the Office of Management and Budget to develop a comprehensive set of outcome metrics to provide better, comprehensive, and consistent measures of program cost and schedule performance. Last year, this cooperative effort resulted in agreement to track trends and changes in programs from their original baselines, from 5 years ago, and from the previous year, for the following data points:

- Development cost;
- Procurement cost;
- Total program cost;
- Quantities to be procured;
- Procurement unit costs;
- Total program unit costs;
- Cycle time from Milestone B to Initial Operational Capability

DOD initiated a pilot study of 7 major defense programs to assess the adequacy of the proposed metrics and their value in analyzing performance, and the results proved promising. DOD approved the outcome metrics and intends to collect and report such data on an annual basis. Efforts to develop similar metrics on schedule performance continue.

We believe that the metrics DOD plans to use are valuable for providing insight into the performance of weapon system programs. We have used similar metrics for many years in assessing programs. For example, we recently reported that ten of DOD's largest acquisition programs, commanding about half the overall acquisition dollars in the department's 2008 portfolio of major programs, have experienced significant cost growth and have seen quantities reduced by almost a third (see table 1). The two largest programs—the Joint Strike Fighter and the Future Combat System—represent significant cost risk moving forward and will dominate the portfolio for years. Since these programs consume such a large portion of the funding that DOD spends on research and development and procurement, their performance also affects other major weapon acquisitions, smaller acquisition programs, and DOD's ability to fund and acquire other supplies and equipment as well.

Table 1: Changes in Costs and Quantities for Ten of the Highest Cost Acquisition Programs

Program	Total cost (fiscal year 2009 dollars in millions)		Total quantity		Acquisition unit cost
	First full estimate	Current estimate	First full estimate	Current estimate	Percentage change
Joint Strike Fighter	206,410	244,772	2,866	2,456	38
Future Combat System	89,776	129,731	15	15	45
Virginia Class Submarine	58,378	81,556	30	30	40
F-22A Raptor	88,134	73,723	648	184	195
C-17 Globemaster III	51,733	73,571	210	190	57
V-22 Joint Services Advanced Vertical Lift Aircraft	38,726	55,544	913	458	186
F/A-18E/F Super Hornet	78,925	51,787	1,000	493	33
Trident II Missile	49,939	49,614	845	561	50
CVN 21 Nuclear Aircraft Class Carrier	34,360	29,914	3	3	-13
P-8A Poseidon Multi-mission Maritime Aircraft	29,974	29,622	115	113	1

Source: GAO analysis of DOD data.

While program outcome metrics are good measures of individual program performance, the collective performance of DOD's portfolio of major defense acquisition programs is a key indicator of how well the department's acquisition system generates the return on investment it promises to the warfighter, Congress, and the taxpayer. Portfolio metrics also provide senior leaders and Congress with a snapshot of the cumulative impact of current investment decisions and poor program performance on future budgets. In our annual assessment of selected weapon programs, we analyzed the performance of DOD programs at the portfolio level by comparing programs' initial cost, schedule, and quantity estimates to their current estimates, based on data obtained from the Selected Acquisition Reports. This year's cumulative results, reported earlier this week,¹ are shown in table 2.

¹ GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-09-326SP (Washington, D.C.: Mar. 30, 2009).

Table 2: Analysis of DOD Major Defense Acquisition Program Portfolios^a

Fiscal year 2009 dollars			
	Fiscal Year		
	2003	2007	2008
Portfolio size			
Number of programs	77	95	96
Total planned commitments	\$1.2 trillion	\$1.6 trillion	\$1.6 trillion
Commitments outstanding	\$724.2 billion	\$675.2 billion	\$786.3 billion
Portfolio indicators			
Change to total RDT&E costs from first estimate	37 percent	40 percent	42 percent
Change to total acquisition cost from first estimate	19 percent	26 percent	25 percent
Total acquisition cost growth	\$183 billion	\$301.3 billion ^b	\$296.4 billion
Share of programs with 25 percent increase in program acquisition unit cost growth	41 percent	44 percent	42 percent
Average schedule delay in delivering initial capabilities	18 months	21 months	22 months

Source: GAO analysis of DOD data.

^aData were obtained from DOD's Selected Acquisition Reports (dated December 2002, 2006, and 2007). In a few cases data were obtained directly from program offices. The number of programs reflects the programs with Selected Acquisition Reports; however, in our analysis we have broken a few Selected Acquisition Reports programs into smaller elements or programs. Not all programs had comparable cost and schedule data and these programs were excluded from the analysis where appropriate. Portfolio performance data do not include costs of developing Missile Defense Agency elements or the DIMHRS program.

^bThe acquisition cost growth for the 2007 portfolio was \$295 billion in 2008 constant dollars.

Analyzing the data and comparing metrics from different time periods provides unique insights into the relative health of the portfolio and trends. From 2003 to 2008, the number of programs in DOD's major defense acquisition portfolio has grown from 77 to 96. Total costs for these programs now total \$1.6 trillion with almost one-half of this amount still to be spent. Outcome metrics for 2008 show worsening performance in all categories compared to the 2003 portfolio and mixed performance—some better, some worse—compared to the 2007 data. While DOD is committing substantially more investment dollars to developing and procuring new weapon systems, the total acquisition costs for the 2008 portfolio has

grown by \$296 billion over initial estimates and the average schedule delay in delivering capabilities to the warfighter averages 22 months. Implications for the future are obvious. Continued cost growth reduces DOD's buying power and results in less funding being available for other DOD priorities and programs. As program costs increase, DOD must request more funding to cover overruns, make trade-offs with existing programs, delay the start of new programs, take funds from other accounts, or reduce procurement quantities. Continued failure to deliver weapon systems on time delays providing critical capabilities to the warfighter and results in operating costly legacy systems longer than expected, finding alternatives to fill capability gaps, or going completely without the capability.

Key Prerequisites Need to Be Met to Improve the Value of Metrics and Achieve Better Acquisition Program Outcomes

While the metrics discussed above can provide valuable knowledge about potential problems and additional information on the health of DOD's acquisition programs, metrics alone may not be sufficient if the department does not do a better job ensuring that acquisitions begin with realistic plans and baseline estimates for cost and schedules prior to development start. We believe there is a clear set of prerequisites that must be a part of any acquisition strategy before any measurement of the acquisition's health can be valuable. Otherwise, metrics measured against unrealistic estimates will do no good. These key prerequisites for obtaining realistic baselines include:

- *Establishing a clear, knowledge-based, evolutionary business case for the product.* This business case must: validate that a need exists; determine that resources are available to develop a product that will meet the need; determine that the product developer has a knowledge-based plan and strategy to deliver the product; establish reasonable estimates for cost, delivery time and quantities; and ensure available funding for the product. All of these elements of the business case should also be agreed upon by major stakeholders across the requirements, funding, acquisition, and warfighting communities.
- *Separating technology development activities from product development activities.* The process of developing technology culminates in discovery—the gathering of knowledge—and must, by its nature, allow room for unexpected results and delays. Leading firms do not ask their product managers to develop technology because they have learned the hard way that invention cannot be scheduled. When immature technologies are brought onto the critical path of product development programs too early, they often cause long delays in an environment where large workforces must be employed, complex tools, plants, and facilities

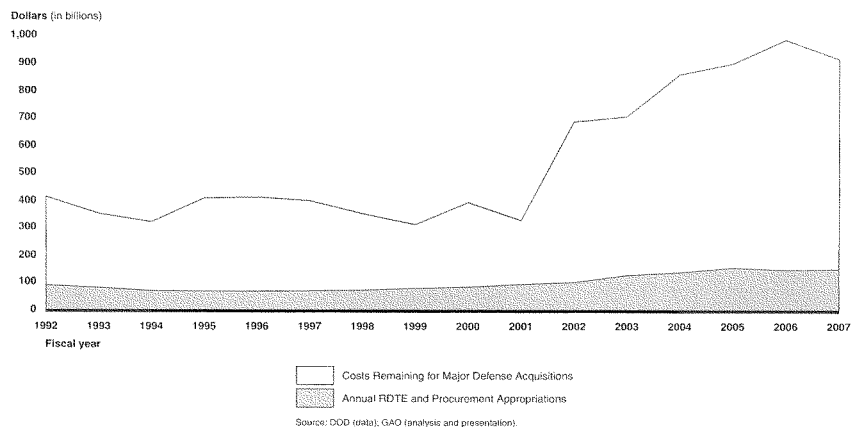
must be operated, long and expensive supplier networks must be paid, and the product itself must sometimes be redesigned once the final form of the technologies is known. Successful programs give responsibility for maturing technologies to science and technology organizations, rather than the program or product development managers, because the science and technology environment is less costly. We have recommended in the past that DOD's risks should be taken in the science and technology arena and that more funding should be made available to this process to do so.

- *Limiting time and requirements for product development to manageable levels.* Product developers should strive to deliver the best available capabilities within realistic timeframes and should expect to continue to develop new capabilities when they are technologically feasible. By limiting product development cycle times to 6 years or less, DOD could assimilate new technologies into weapon systems more frequently, accelerate delivery of new technology to the warfighter, hold program managers accountable, and make more frequent and predictable work in production, where contractors and the industrial base can profit by being efficient. Too many major acquisitions currently take the opposite approach by seeking to deliver a revolutionary "big bang" capability in one step. This means that programs are more risky, delivery takes as long as 15 years in some cases, and costs grow at exponential rates from the original baseline due to the risky nature of the acquisition strategy. We point to the private sector and some past defense acquisitions, such as the F-16 program, as models for this practice.
- *Employing early systems engineering discipline in order to develop realistic cost and schedule estimates prior to development start.* Early systems engineering provides the knowledge a product developer needs to identify and resolve performance and resource gaps before product development begins either by reducing requirements, deferring them to the future, or increasing the estimated cost for the weapon system's development. Requirements that are too risky given the state of technology and design should not be allowed into this expensive environment.
- *Making a commitment to fully fund programs once they are approved.* This would require the department to ensure that it does not have too many programs underway given the amount of available resources.
- *Setting priorities from the top to ensure that candidate programs are truly needed and have a solid plan for delivery.* DOD will continue to experience poor acquisition outcomes until it begins making choices that reflect the most important needs of the joint warfighter and match

requirements with available resources. The urge to accept all candidate programs and to go for the "big bang" capability without the knowledge to achieve it should be resisted. Only the best candidates--defined in terms of priorities, resource availability, and executability--should be approved.

There is no doubt that the current state of the department's acquisition process is too expensive for the taxpayer and not timely enough for the warfighter. The following illustration reinforces this point.

Figure 2: Cost Remaining Versus Annual Appropriations for Major Defense Acquisitions



This figure depicts an investment strategy for major weapon systems that continues to increase the costs to develop our existing weapons well into the future while the funding available to retire those costs appears capped at a very low level. While costs continue to rise as the result of more and more risky programs being added to the portfolio, our ability to allocate funds for these costs appears to be, at best, capped at very low percentages of the total cost. We could measure the risk of these acquisitions much better than we have in the past if we set the appropriate prerequisites for their initiation, measure the knowledge that must be in place at various points, and continue to monitor their health in terms of cost and schedule.

Concluding Remarks

Measuring the performance of weapon system programs both individually and collectively is critical for determining whether the warfighter and the taxpayer are receiving the promised return on investment. No single metric, however, can capture the whole picture of how well programs are performing. It is important to look at knowledge and outcome metrics. Knowledge metrics provide key information for determining whether programs have the requisite knowledge to move from one phase of development to the next and are at risk of cost and schedule overruns. Outcomes metrics are also needed to provide temperature checks on the health and status of individual programs and the portfolio of programs as a whole. These metrics are vital for informing program decision making and helping to manage programs.

Metrics by themselves do not solve problematic acquisitions. Ultimately, DOD still needs to do a better job planning and executing programs to achieve better outcomes. Critical to achieving successful outcomes is establishing knowledge-based, realistic program baselines. Without realistic baselines, there is no foundation for accurately measuring the knowledge and health of programs. Over the past several years, our work has highlighted a number of underlying causes for why DOD does not effectively manage the acquisition of weapon system programs. DOD recently revised its acquisition policy to provide a better foundation for developing weapon systems, however, reform will not be achieved without fundamental changes to the overall acquisition culture and environment that exists in DOD. I would be pleased to discuss these causes and issues with the Committee at a future time.

Mr. Chairman, this concludes my prepared statement. I would be happy to answer any questions you may have at this time.

Contacts and Acknowledgements

For further information about this statement, please contact Michael J. Sullivan (202) 512-4841 or sullivanm@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals who made key contributions to this statement include Cheryl Andrew, Ridge Bowman, Bruce Fairbairn, Susan Neill, John Oppenheim, and Ron Schwenn.

Attachment 1: Knowledge-Based Activities

Knowledge Point 1: Start of product development activities
Best practice metric: Technology readiness level 7 (indicating technologies work in an operational environment)
Demonstrate technologies to high readiness levels
Ensure that requirements for the product increment are informed by preliminary design using systems engineering process (such as prototyping of preliminary design)
Establish cost and schedule estimates for product on the basis of knowledge from preliminary design using system engineering tools (such as prototyping of preliminary design)
Constrain development phase (5 to 6 years or less) for incremental development
Ensure development phase fully funded (programmed in anticipation of milestone)
Align program manager tenure to complete development phase
Contract strategy that separates system integration and system demonstration activities
Conduct independent cost estimate
Conduct independent program assessment
Conduct major milestone decision review for development start
Knowledge Point 2: Transition from system integration to system demonstration activities
Best practice metric: 90 percent of design drawings are complete by the critical design review
Complete system critical design review
Complete 90 percent of engineering design drawing packages
Complete subsystem and system design reviews
Demonstrate with system integration prototype that design meets requirements
Complete the failure modes and effects analysis
Identify key system characteristics
Identify critical manufacturing processes
Establish reliability targets and growth plan on the basis of demonstrated reliability rates of components and subsystems
Conduct independent cost estimate
Conduct independent program assessment
Conduct major milestone decision review to enter system demonstration
Knowledge Point 3: Initiation of producing a product to be delivered to customer
Best practice metric: 100 percent of critical manufacturing processes are in control
Demonstrate manufacturing processes
Build and test production-representative prototypes to demonstrate product in operational environment
Test production-representative prototypes to achieve reliability goal
Collect statistical process control data
Demonstrate that critical processes are capable and in statistical control
Independent cost estimate
Independent program assessment
Conduct major milestone decision review to begin production

Source: GAO analysis of commercial best practices.

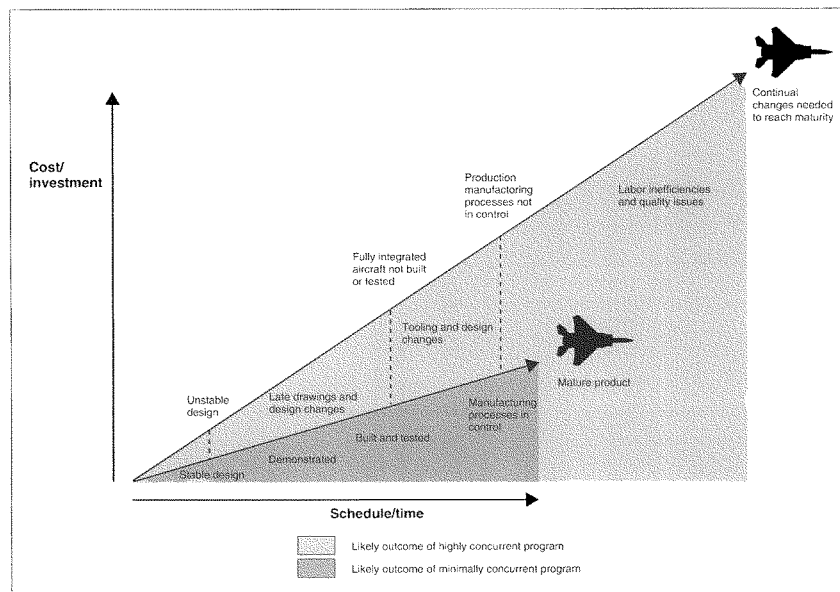
Attachment 2: Technology Readiness Levels

Technology readiness level	Description	Hardware Software	Demonstration Environment
1. Basic principles observed and reported.	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties	None (paper studies and analysis)	None
2. Technology concept and/or application formulated.	Invention begins. Once basic principles are observed, practical applications can be invented. The application is speculative and there is no proof or detailed analysis to support the assumption. Examples are still limited to paper studies.	None (paper studies and analysis)	None
3. Analytical and experimental critical function and/or characteristic proof of concept.	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.	Analytical studies and demonstration of nonscale individual components (pieces of subsystem).	Lab
4. Component and/or breadboard. Validation in laboratory environment.	Basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in a laboratory.	Low fidelity breadboard. Integration of nonscale components to show pieces will work together. Not fully functional or form or fit but representative of technically feasible approach suitable for flight articles.	Lab
5. Component and/or breadboard validation in relevant environment.	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so that the technology can be tested in a simulated environment. Examples include "high fidelity" laboratory integration of components.	High fidelity breadboard. Functionally equivalent but not necessarily form and/or fit (size weight, materials, etc). Should be approaching appropriate scale. May include integration of several components with reasonably realistic support elements/subsystems to demonstrate functionality.	Lab demonstrating functionality but not form and fit. May include flight demonstrating breadboard in surrogate aircraft. Technology ready for detailed design studies.
6. System/subsystem model or prototype demonstration in a relevant environment.	Representative model or prototype system, which is well beyond the breadboard tested for TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high fidelity laboratory environment or in simulated realistic environment.	Prototype. Should be very close to form, fit and function. Probably includes the integration of many new components and realistic supporting elements/subsystems if needed to demonstrate full functionality of the subsystem.	High-fidelity lab demonstration or limited/restricted flight demonstration for a relevant environment. Integration of technology is well defined.

Technology readiness level	Description	Hardware Software	Demonstration Environment
7. System prototype demonstration in a realistic environment.	Prototype near or at planned operational system. Represents a major step up from TRL 6, requiring the demonstration of an actual system prototype in a realistic environment, such as in an aircraft, vehicle or space. Examples include testing the prototype in a test bed aircraft.	Prototype. Should be form, fit and function integrated with other key supporting elements/subsystems to demonstrate full functionality of subsystem.	Flight demonstration in representative realistic environment such as flying test bed or demonstrator aircraft. Technology is well substantiated with test data.
8. Actual system completed and "flight qualified" through test and demonstration.	Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental test and evaluation of the system in its intended weapon system to determine if it meets design specifications.	Flight qualified hardware	Developmental Test and Evaluation (DT&E) in the actual system application
9. Actual system "flight proven" through successful mission operations.	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. In almost all cases, this is the end of the last "bug fixing" aspects of true system development. Examples include using the system under operational mission conditions.	Actual system in final form	Operational Test and Evaluation (OT&E) in operational mission conditions

Source: GAO and its analysis of National Aeronautics and Space Administration data.

Attachment 3: Notional Illustration Showing the Different Paths That a Product's Development Can Take



Source: GAO.

Related GAO Products

Defense Acquisitions: Assessment of Major Weapon Programs. GAO-09-326SP. Washington, D.C.: March 30, 2009.

Defense Acquisitions: DOD Must Prioritize Its Weapon System Acquisitions and Balance Them with Available Resources. GAO-09-501T. Washington, D.C.: March 18, 2009.

Defense Acquisitions: DOD Must Balance Its Needs with Available Resources and Follow an Incremental Approach to Acquiring Weapon Systems. GAO-09-431T. Washington, D.C.: March 3, 2009.

Defense Acquisitions: Perspectives on Potential Changes to DOD's Acquisition Management Framework. GAO-09-295R. Washington, D.C.: February 27, 2009.

Defense Management: Actions Needed to Overcome Long-standing Challenges with Weapon Systems Acquisition and Service Contract Management. GAO-09-362T. Washington, D.C.: February 11, 2009.

Defense Acquisitions: Fundamental Changes Are Needed to Improve Weapon Program Outcomes. GAO-08-1159T. Washington, D.C.: September 25, 2008.

Defense Acquisitions: DOD's Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities. GAO-08-1060. Washington, D.C.: September 25, 2008.

Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes. GAO-08-619. Washington, D.C.: July 2, 2008.

Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment. GAO-08-782T. Washington, D.C.: June 3, 2008.

Defense Acquisitions: Assessments of Selected Weapon Programs. GAO-08-467SP. Washington, D.C.: March 31, 2008.

Best Practices: Increased Focus on Requirements and Oversight Needed to Improve DOD's Acquisition Environment and Weapon System Quality. GAO-08-294. Washington, D.C.: February 1, 2008.

Cost Assessment Guide: Best Practices for Estimating and Managing Program Costs. GAO-07-1134SP. Washington, D.C.: July 2007.

Defense Acquisitions: Assessments of Selected Weapon Programs. GAO-07-406SP. Washington, D.C.: March 30, 2007.

Best Practices: An Integrated Portfolio Management Approach to Weapon System Investments Could Improve DOD's Acquisition Outcomes. GAO-07-388. Washington, D.C.: March 30, 2007.

Defense Acquisitions: Major Weapon Systems Continue to Experience Cost and Schedule Problems under DOD's Revised Policy. GAO-06-368. Washington, D.C.: April 13, 2006.

DOD Acquisition Outcomes: A Case for Change. GAO-06-257T. Washington, D.C.: November 15, 2005.

Best Practices: Better Support of Weapon System Program Managers Needed to Improve Outcomes. GAO-06-110. Washington, D.C.: November 1, 2005.

Defense Acquisitions: Stronger Management Practices Are Needed to Improve DOD's Software-Intensive Weapon Acquisitions. GAO-04-393. Washington, D.C.: March 1, 2004.

Defense Acquisitions: DOD's Revised Policy Emphasizes Best Practices, but More Controls Are Needed. GAO-04-53. Washington, D.C.: November 10, 2003.

Best Practices: Setting Requirements Differently Could Reduce Weapon Systems' Total Ownership Costs. GAO-03-57. Washington, D.C.: February 11, 2003.

Defense Acquisitions: Factors Affecting Outcomes of Advanced Concept Technology Demonstration. GAO-03-52. Washington, D.C.: December 2, 2002.

Best Practices: Capturing Design and Manufacturing Knowledge Early Improves Acquisition Outcomes. GAO-02-701. Washington, D.C.: July 15, 2002.

Defense Acquisitions: DOD Faces Challenges in Implementing Best Practices. GAO-02-469T. Washington, D.C.: February 27, 2002.

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Mr. Sullivan currently serves as Director, Acquisition and Sourcing Management, at the U.S. Government Accountability Office. This group has responsibility for examining the effectiveness of agency acquisition and procurement practices in meeting their mission performance objectives and requirements. In addition to directing reviews of major weapon system acquisitions, Mr. Sullivan has developed and directs a body of work examining how the Department of Defense can apply best commercial practices to the nation's largest and most technically advanced weapon systems. This work has spanned a broad range of issues critical to the successful delivery of systems, including quality assurance, transition to production, technology inclusion, requirement-setting, design and manufacturing, reducing total ownership cost, software management, and affordability. His team also provides the Congress with early warning on technical and management challenges facing these investments.

Mr. Sullivan has been with GAO for 23 years. He received a bachelor's degree in Political Science from Indiana University and a Masters Degree in Public Administration from the School of Public and Environmental Affairs, Indiana University. Mr. Sullivan is married and has two children.

**WITNESS RESPONSES TO QUESTIONS ASKED DURING
THE HEARING**

APRIL 1, 2009

RESPONSES TO QUESTIONS SUBMITTED BY MR. ANDREWS

Mr. AHERN. The version of DoD Instruction 5000.2 just issued in December 2008 eliminates much of what others refer to as “wobble room” compared to the 2003 version. I view the Department’s task now as one of the Components properly executing their acquisition programs in accordance with DoDI 5000.2 and the OSD staff ensuring we undertake disciplined, thorough program and milestone reviews before allowing programs to proceed to the next acquisition phase. We will monitor how the new guidance is being applied and, if necessary, will issue policy changes to sharpen and improve the process. If any of our changes require new legislation, the Department will submit a legislative provision for your consideration. [See page 28.]

Mr. AHERN. What you suggest is a SAR-like submission during the Technology Development phase of the acquisition process. Technology Development is a continuous technology discovery and development process reflecting close collaboration between the S&T community, the user, and the system developer. It includes significant competitive prototyping that will inform us on the realism of requirements and the maturity of technology. It will also significantly improve our cost estimates for the Engineering and Manufacturing Development and the Production and Deployment phases. However, at this point in the acquisition process there is no clearly defined program to report on. As such, an annual SAR-like submission that purports to provide SAR-quality information for the technology development effort’s life cycle would have limited credibility or utility. There is an existing certification requirement (10 U.S.C. 2366a) that does establish expectations for system cost during technology development. Under that provision, if the projected cost of the system, at any time prior to Milestone B approval, exceeds the cost estimate for the system submitted at the time of the certification by at least 25 percent, the Milestone Decision Authority, in consultation with the Joint Requirements Oversight Council, shall determine whether the level of resources required to develop and procure the system remains consistent with the priority level assigned by the Joint Requirements Oversight Council. The Milestone Decision Authority may then withdraw the certification concerned or rescind Milestone A approval if the Milestone Decision Authority determines that such action is in the interest of national defense. This is consistent with the iterative nature of the Technology Development phase in assessing the viability of technologies while simultaneously refining user requirements allowing the Milestone Decision Authority to make an informed judgment whether the priority warrants committing to a higher-cost program. Once the program has been initiated and receives Milestone B approval, the Department establishes an Acquisition Program Baseline, holds the program manager accountable for execution to it, and provides Congress the SAR. [See page 28.]

Mr. SULLIVAN. A pre-Milestone B SAR-like report could be a valuable tool for assessing whether a program is on track to have a solid understanding of requirements, technology, and cost before formally becoming an acquisition program. It could serve as the basis for illuminating early trades in all areas (cost, schedule, requirements, and technology) and as an early warning mechanism to identify programs that are proceeding without the requisite knowledge in those areas. However, given that the pre-Milestone B technology development phase is a time when cost, schedule, and performance trades should be encouraged, we would not recommend using this reporting tool as a baseline control mechanism to apply Nunn-McCurdy-like standards to technology development costs. Annual reporting could begin at Milestone A. Much like the current SAR, it could provide basic information about the mission need the program fulfills the acquisition and technology development strategies, the program’s activities to date, and contract performance. It could also provide information on the programs’ schedule, cost, performance, and knowledge that is tailored to the early stages of the acquisition process. These data could include the following:

Capability Need: A description of the capability need that justifies the program, including the following:

- capability gap that needs to be filled
- priority level assigned by JROC to this capability need

- timeframe in which the overall capability is required
- type of materiel solution preferred—information system solution, evolutionary development of an existing capability, or a transformational approach

Analysis of Alternatives (AOA): A description of the assessment and results, including the following:

- the scope of alternatives considered in the AOA
- the recommended solution derived from the AOA
- the technical, operational, and programmatic risks identified with the recommended solution

Schedule: A baseline estimate set at Milestone A and current estimates for the completion of the following:

- Systems engineering reviews: System Functional Review, System Requirements Review, Software Specification Review, Preliminary Design Review
- Technology development: Technology Readiness Assessment, Prototype Demonstration (start and completion)
- Requirements: Capability Development Document
- Development cycle: Estimated cycle time in months (Milestone A to B), Estimated cycle time in months (Milestone B to C) by increment of capability (if applicable)

Cost: A baseline estimate set at Milestone A and current estimates in base year and then year dollars for the following:

- Cost estimate for Milestone B through completion reported as a range of likely costs

Performance: Prioritized list of Key Performance Parameters that includes:

- Proposed performance baseline at Milestone A
- Current estimate of performance
- Level of performance that will be demonstrated in the Technology Development Phase
- Level of performance that has been demonstrated in the Technology Development Phase
- Critical technologies that are enablers for each Key Performance Parameter
- Description of requirements that were added or removed during the Technology Demonstration Phase

Technology knowledge: List of the program's critical technologies that includes:

- Milestone A, current, and projected Milestone B technology readiness levels
- Most current test environment (lab, relevant, operational)
- Most current physical status (breadboard, functional prototype, full-up prototype)
- Description of trades available if technology does not mature as planned (use an existing technology, reduce or defer requirements, etc)
- Schedule for maturing technologies to TRL level 7 (i.e. demonstrated in a realistic environment)

Design knowledge: Current estimates of the following:

- Total and projected number of drawings released by the Preliminary Design Review
- Estimated size of the software development effort (in lines of codes)

[See page 28.]

RESPONSE TO QUESTION SUBMITTED BY MR. CONAWAY

Mr. SULLIVAN. DOD policy requires the CAIG to prepare an independent life cycle cost estimate for a major defense acquisition program Milestone B decision. The policy states that the Milestone Decision Authority shall consider the CAIG estimate before approving the program to start system development. It does not require a reconciliation of the CAIG estimate with other service or program office estimates.

In a July 2008 report, GAO found that program cost estimates are often significantly understated—a finding consistent with cost growth patterns reported by RAND, the Institute for Defense Analysis (IDA), and other organizations that con-

duct defense analyses.¹ In that report, GAO analyzed the cost of 20 major defense acquisition programs through December 2007. While the CAIG estimates generally underestimated costs by a smaller amount than program office and service estimates, the CAIG estimates could underestimate a program's costs by billions of dollars (see table 1). For example, the initial service estimate for the development of the Marines' Expeditionary Fighting Vehicle was about \$1.1 billion. The CAIG estimated the development cost of the program to be \$1.4 billion, but the expected development costs for the program had grown to close to \$3.6 billion. In the case of the Future Combat System (FCS), the Army's initial estimate for the development cost was about \$20 billion, while the CAIG's estimate was \$28 billion. DOD began the program using the Army's estimate of \$20 billion, but development costs for FCS had grown to an estimated \$28 billion. Many programs are also approved to start development based on the service or program office cost estimate rather than the CAIG estimate. Less than a quarter of the 48 programs in GAO's 2009 assessment of weapon system programs that provided data used the estimate made by the CAIG as a basis for the program's baseline, while almost 70 percent of the programs used the program office or service cost estimate.² [See page 27.]

Table 1: Development Cost Estimates and Baselines for 20 Major Weapon System Programs (2008 dollars in millions)

Program	Development cost estimate			Development cost baselines		
	Service	CAIG	Percent difference	Initial	As of December 2007	Percent change
Global Hawk	\$905	\$992	10%	\$967	\$3,515	264%
UH-60M helicopter upgrade	311	379	22	311	838	169
WIN-T	338 ^a	807	139	796	2,088	162
C-130 Avionics Modernization	1,020	1,175	15	720	1,844	156
Expeditionary Fighting Vehicle	1,056	1,438	36	1,472	3,556	142
Advanced Extremely High Frequency Satellites	3,031	3,175	5	2,923	6,008	105
Wideband Global SATCOM	296	414	40	199	323	62
Future Combat Systems	20,248	27,184	34	20,248	27,955	38
Joint Strike Fighter ^b	30,500	31,476	3	33,939	40,210	18
COBRA JUDY replacement	1,398	1,521	9	1,527	1,626	6
E-2 Advanced Hawkeye	3,495	3,720	6	3,589	3,796	6
EA-18G	1,707	1,795	5	1,797	1,865	4
VH-71 Presidential Helicopter	3,378	3,569	6	3,771	3,859	2
Joint Land Attack Cruise Missile Defense Elevated Netted Sensor	1,781	1,926	8	1,894	1,922	1
C-5 Reliability Enhancement and Engineering Program	1,454	1,583	9	1,627	1,630	0 ^c
CH-53K Heavy Lift Replacement	3,970	4,293	8	4,149	4,095	-1
Longbow Apache III	1,155	1,382	20	1,095	1,087	-1
Multi-mission Maritime Aircraft	6,100	6,970	14	7,080	6,804	-4
Small Diameter Bomb	416	427	3	415	395	-5
Standard Missile 6	1,000	992	-1	1,009	932	-8

Source: GAO analysis of DOD data.

^aThe service's original estimate for the WIN-T program was \$363 million but was revised prior to Milestone B to align with the CAIG's estimate.

^bJSF data include Air Force and Navy portions of the program only.

^cC-5 RERP costs have increased by almost \$4 million. However, due to rounding, the table indicates a 0 percent increase.

¹GAO, *Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes*, GAO-08-619 (Washington, D.C.: July 2, 2008); Assessment Panel of the Defense Acquisition Performance Assessment Project for the Deputy Secretary of Defense, *Defense Acquisition Performance Assessment Report* (Washington, D.C.: Jan. 2006); Defense Science Board, *Defense Science Board Summer Study on Transformation: A Progress Assessment* (Washington, D.C.: Feb. 2006); RAND, *Historical Cost Growth of Completed Weapon System Programs* (Santa Monica: 2006); and Institute for Defense Analysis, *Costs Growth in Major Weapon Procurement Programs*, Presentation to the 38th Annual DoD Cost Analysis Symposium (Williamsburg: Feb. 2005).

²GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-09-326SP (Washington, D.C.: March 30, 2009).

RESPONSE TO QUESTION SUBMITTED BY MR. SESTAK

Mr. AHERN. The Department addresses Modeling and Simulation (M&S) Verification, Validation, and Accreditation (VV&A) both in policy and in guidance. On the policy side, DoD Instruction 5000.2, "Operation of the Defense Acquisition System," addresses M&S as part of an integrated test and evaluation (T&E) continuum that includes developmental, operational, and live fire T&E; family-of-systems interoperability testing; and information assurance testing. The Test and Evaluation Strategy requires empirical data to validate models and simulations and expects reconciliation of pre-test predictions with post-test results. The policy also provides for the use of accredited models in support of developmental T&E, initial operational T&E, and live fire T&E. DoD Instruction 5000.59, "DoD Modeling and Simulation (M&S) Management," establishes the M&S Steering Committee that oversees the development of VV&A policies, plans, and procedures. DoD Instruction 5000.61, DoD "Modeling & Simulation Verification, Validation and Accreditation," establishes common-sense guidelines and requires that models and simulations used to support major DoD decision-making organizations and processes (e.g., the Defense Acquisition Board; Joint Requirements Oversight Council; and Planning, Programming, Budgeting, and Execution System) "shall be accredited for that specific purpose by the M&S application sponsor". DoD Instruction 5000.61 also requires that VV&A be documented. In terms of guidance, the Department has taken a number of steps. The Defense Acquisition Program Support Methodology used in program support reviews includes strong criteria for evaluating a program's VV&A efforts. We have an on-line "VV&A Recommended Practices Guide." A new military standard, MIL-STD 3022, "Documentation of VV&A for M&S" was approved last year and is already in use for acquisition purposes across the Department. A DoD VV&A Documentation Tool automates production of the MIL-STD 3022 VV&A document set and became operational this year. We are also developing risk-based VV&A guidelines and pursuing routine examination of VV&A when M&S informs major acquisition decisions. The Department does not keep central records of VV&A and no studies have been performed to assess VV&A documentation. So, without a data call to the DoD Components, it is not practical to provide a quantitative assessment of overall DoD VV&A performance. The Department recognizes that VV&A is important so that we have confidence in our models and simulations. While VV&A is covered both in policy and guidance, we also know that we need to continue working with the Components to ensure models used in our decision-making processes are properly accredited. [See page 24.]

